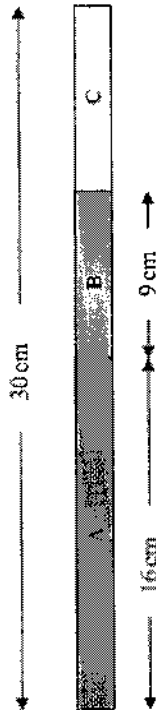


1



Diagram NOT
accurately drawn



Here is a picture of a stick.
The stick is in three parts, A, B and C.
The total length of the stick is 30 cm.
The length of part A is 16 cm.
The length of part B is 9 cm.

Work out the length of part C.

$$\begin{aligned} A + B + C &= 30 \text{ cm} \\ 16 + 9 + C &= 30 \\ 25 + C &= 30 \\ C &= 30 - 25 \\ C &= 5 \text{ cm} \end{aligned}$$

5 cm
(Total 2 marks)

2



Jessica thinks of a number.
She multiplies the number by 3.
She then subtracts 7.
Her answer is 5.

What number did Jessica think of?

Let number be x

$$\begin{aligned} 3x - 7 &= 5 & (+7) \\ 3x &= 5 + 7 \\ 3x &= 12 & (\div 3) \\ x &= \frac{12}{3} = 4 \end{aligned}$$

$x = 4$
(Total 2 marks)

3

The total cost of these 2 pens is 60p.



Work out the total cost of 5 of these pens.

Give your answer in pounds.

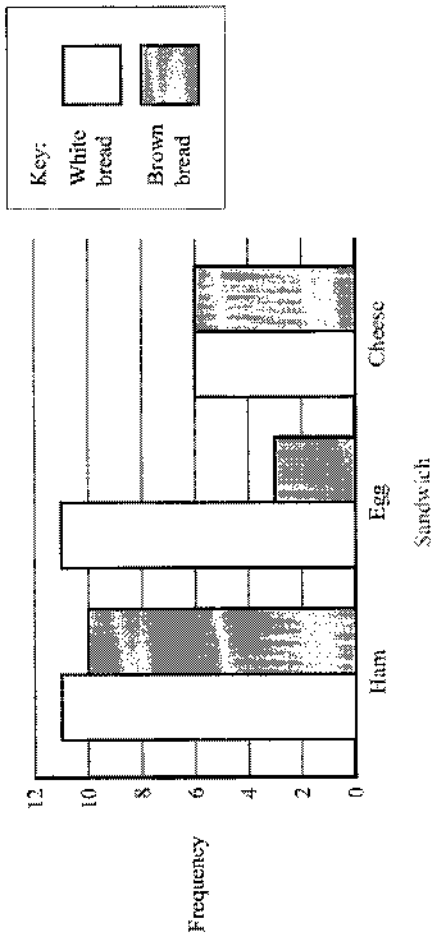
$$\begin{aligned}
 2 \text{ pens} &= 60\text{p} \\
 1 \text{ pen} &= \frac{60}{2} = 30\text{p} \\
 5 \text{ pens} &= 5 \times 30 = 150\text{p} \\
 &= \pounds 1.50
 \end{aligned}$$

£ 1.50
(Total 3 marks)

4

Ann works in a sandwich shop.

The dual bar chart shows information about the sandwiches sold.



(a) Write down the total number of cheese sandwiches sold.

$$6 + 6$$

12
(1)

More white bread sandwiches were sold than brown bread sandwiches.

(b) Work out how many more white bread sandwiches.

$$\text{White} = 11 + 11 + 6 = 28$$

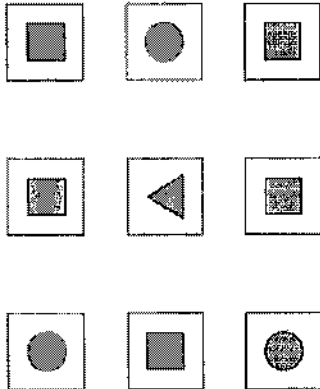
$$\text{Brown} = 10 + 3 + 6 = 19$$

$$28 - 19 = 9$$

9
(2)
(Total 3 marks)

5

James has 9 cards.
Each card has a shape drawn on it.
Each shape is a circle or a square or a triangle.



James takes a card at random.

- (i) Which shape is **most** likely to be on the card?

Square

- (ii) What is the probability that James takes a card that has a square on it?

$$P(\text{square}) = \frac{5}{9}$$

$$\frac{5}{9}$$

(Total 3 marks)

6

David is going to buy a cooker.
The cooker has a price of £320.
David pays a deposit of 15% of the price of the cooker.

How much money does David pay as a deposit?

$$10\% \text{ of } £320 = £32$$

$$5\% \text{ of } £320 = £16$$

$$\text{So } 15\% = £32 + £16 = £48$$

£ 48

(Total 2 marks)

7

(a) Solve $x + 3 = 12$

$$x = 12 - 3$$

$$x = 9$$

(b) Solve $\frac{y}{5} = 10$

$$y = 10 \times 5$$

$$y = 50$$

$$x = 9 \quad (1)$$

$$y = 50 \quad (1)$$

(Total 2 marks)

8

Here is a menu in a café.

Menu	
Starter	Main Course
Soup	Chicken
Melon	Fish
	Omelette

A meal is a starter and a main course.
One possible meal is Soup and Chicken, (S, C).

Charlie wants to choose a meal.

- (a) Make a list of all the different meals she can have.
One has been done for you.

(S, C) (S, F) (S, O) (M, C) (M, F) (M, O)

(2)

A meal is chosen at random.

- (b) What is the probability that the meal will be Melon and Chicken?

(M, C) occurs one
out of the 6 times $\frac{1}{6}$ (1)

The café adds fruit juice as another starter.

Charlie says 'Now there will be one more meal to choose from'.

- (c) Show that Charlie is wrong.

Will be 3 more meals
(F, C) (F, F) (F, O) (1)

(Total 4 marks)

9

The diagram shows a rectangle and a square.

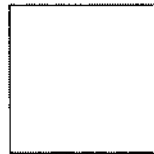


Diagram NOT
accurately drawn

The perimeter of the rectangle is the same as the perimeter of the square.

Work out the length of one side of the square.

perimeter of Rectangle

$$= 2 + 8 + 2 + 8$$

$$= 20\text{cm}$$

Length of side of square

$$= 20 \div 4 = 5\text{cm}$$

5 cm

(Total 4 marks)

10

(a) Write 8 45 p.m. as a 24-hour clock time.



20 : 45

(1)

Seeta did a puzzle in 3 minutes 45 seconds.
Ninal did the same puzzle in 7 minutes 28 seconds.

Seeta says,

'I did the puzzle in less than half the time Ninal did the puzzle.'

(b) Is Seeta right?
You must show all your working.

$$\text{Seeta } 3 \text{ mins } 45 \text{ sec} = (3 \times 60) + 45$$

$$= 180 + 45$$

$$= 225 \text{ sec}$$

$$\text{Ninal } 7 \text{ min } 28 \text{ s} = (7 \times 60) + 28$$

$$= 420 + 28$$

$$= 448 \text{ sec}$$

Half the time Ninal did puzzle in

$$= 448 \div 2 = 224 \text{ sec}$$

So Seeta is wrong.

(3)
(Total 4 marks)

11

Work out $\frac{3}{4} + \frac{1}{8}$

Give your answer in its simplest form.

Find Common Denominator

LCM is 8

$$\frac{3}{4} + \frac{1}{8}$$

$$= \frac{6}{8} + \frac{1}{8} = \frac{7}{8}$$

$$\begin{array}{r} \times 2 \nearrow \\ \frac{3}{4} = \frac{6}{8} \\ \times 2 \searrow \end{array}$$

$$\frac{7}{8}$$

(Total 2 marks)

12

Write these numbers in order of size.
Start with the smallest number.

$$0.6 \quad \frac{2}{3} \quad 65\% \quad 0.606$$

Change all to decimals and compare

$\frac{2}{3}$ To change to a decimal
divide the number on

$$= 0.66666\dots$$

the top (numerator) by the
number on bottom (denominator)

$$\begin{array}{r} 0.66666\dots \\ 3 \overline{) 2.00000} \end{array}$$

$$65\% = 65 \div 100 = 0.65$$

In order

$$0.6 \quad 0.606 \quad 0.65 \quad 0.66666\dots$$

$$\text{ie } 0.6 \quad 0.606 \quad 65\% \quad \frac{2}{3}$$

$$0.6, 0.606, 65\%, \frac{2}{3}$$

(Total 2 marks)

13

One kilogram of cheese costs £5.60.
Jane buys 200 g of cheese.

Work out how much Jane pays.

$$1 \text{ kg} = 1000 \text{ g} \quad (= 5 \times 200 \text{ g})$$

$$200 \text{ g} \text{ cost } \frac{£5.60}{5} = £1.12$$

$$£ 1.12$$

(Total 3 marks)

14

Mr Brown and his 2 children are going to London by train.

An adult ticket costs £24.

A child ticket costs £12.

Mr Brown has a Family Railcard.

Family Railcard gives

$\frac{1}{3}$ off adult tickets

60% off child tickets

Work out the total cost of the tickets when Mr Brown uses his Family Railcard.

$$\frac{1}{3} \text{ off adult price of } £24 : \frac{1}{3} \text{ of } £24 = 24 \div 3 = £8 \text{ off price}$$

$$\text{Adult pays } £24 - 8 = £16$$

60% off child ticket :

$$10\% \text{ of } £12 = £1.20$$

$$60\% = £1.20 \times 6 = £7.20 \text{ off price}$$

$$1 \text{ child pays } £12 - £7.20 = £4.80$$

$$\text{Total cost} = £16 + £4.80 + £4.80$$

$$= £25.60$$

(Total 4 marks)

15

Work out 452×36

Work out 452×36

X	400	50	2
30	12000	1500	60
6	2400	300	12

or

$$\begin{array}{r} 452 \\ \times 36 \\ \hline 2712 \\ 13560 \\ \hline 16272 \end{array}$$

16272

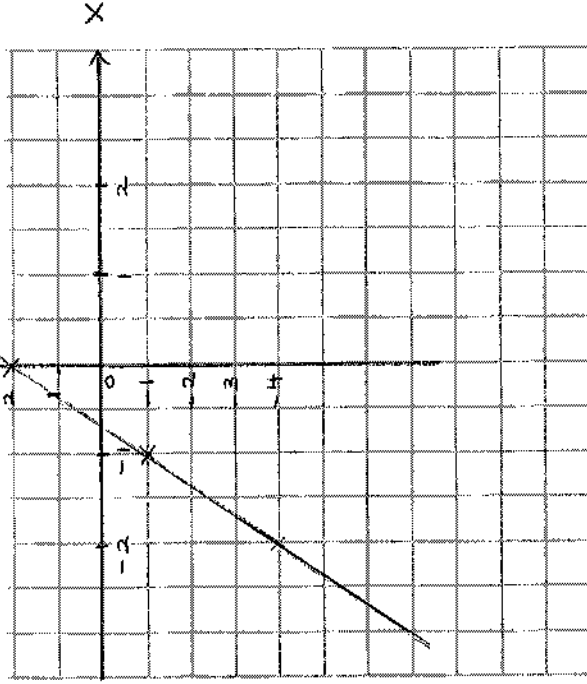
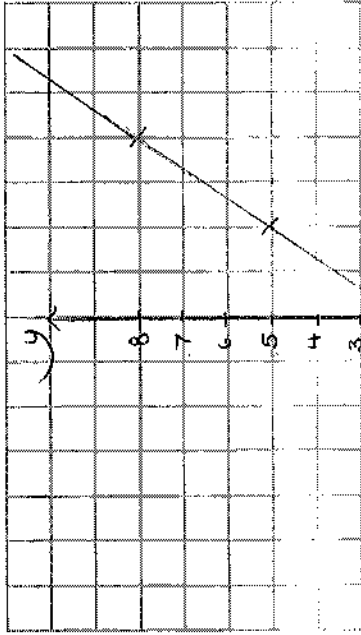
(Total 3 marks)

16

On the grid, draw the graph of $y = 3x + 2$ for values of x from -2 to 2 .

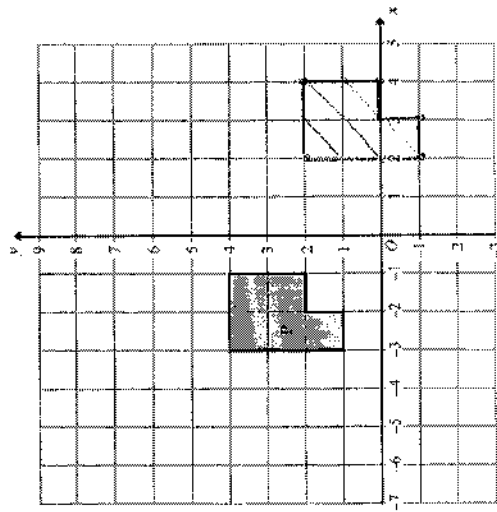
Draw a table of Values using any 3 of these values

x	-2	-1	0	1	2
y	-4	-1	2	5	8



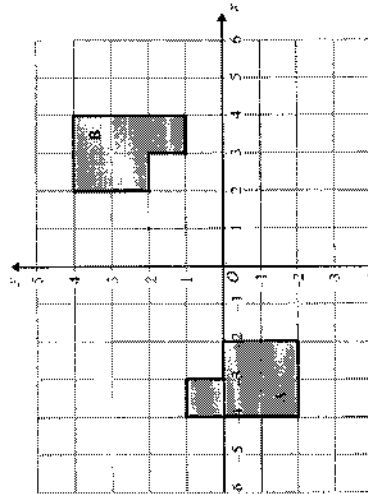
(Total 4 marks)

17



(a) Translate shape P by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$.

(2)



(b) Describe fully the single transformation that maps shape A onto shape B.

Rotation 180°

Centre (0,1)

(3)

(Total 5 marks)

18

(a) Simplify $\frac{(x+2)^2}{x+2}$ ← Square multiply the bracket by itself

$$= \frac{(x+2)(x+2)}{x+2}$$

$$x+2 \quad (1)$$

(b) Simplify $2a^2b \times 3a^3b$

$$= 6a^5b^2$$

$$6a^5b^2$$

(2)

(Total 3 marks)

19

Talil is going to make some concrete mix.
He needs to mix cement, sand and gravel in the ratio 1 : 3 : 5 by weight.
Talil wants to make 180 kg of concrete mix.

Talil has

- 15 kg of cement
- 85 kg of sand
- 100 kg of gravel

Does Talil have enough cement, sand and gravel to make the concrete mix?

c s g

Divide 180 kg in ratio 1 : 3 : 5

9 equal parts = 180 kg

1 part = $180 \div 9 = 20$ kg

Cement = $1 \times 20 = 20$ kg

Sand = $3 \times 20 = 60$ kg

Gravel = $5 \times 20 = 100$ kg

cement

sand

gravel

20	20	20	20
20	20	20	20
20	20	20	20

He has

15 kg cement - Needs 5 kg more cement

85 kg sand - Has 25 kg more sand

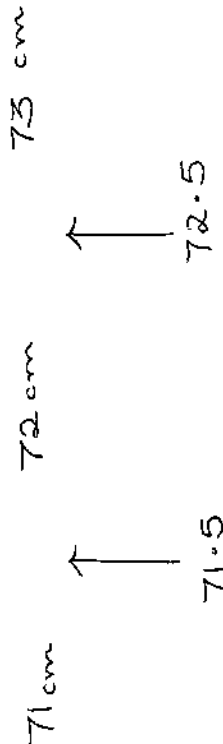
100 kg gravel - Has enough gravel

So he doesn't have enough cement
needs 5 kg more

(Total 4 marks)

20

The height, H cm, of a table is measured as 72 cm correct to the nearest centimetre.
Complete the following statement to show the range of possible values of H .

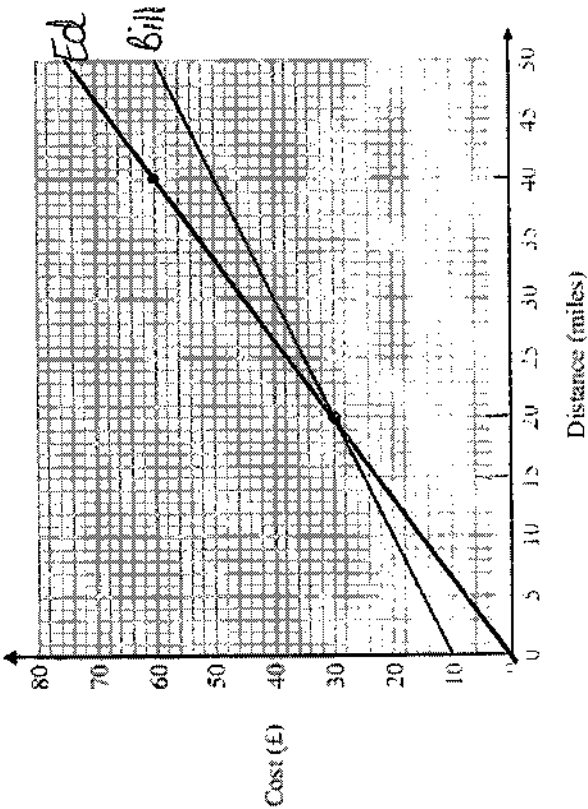


$71.5 \leq H < 72.5$

(Total 2 marks)

21

Bill uses his van to deliver parcels.
For each parcel Bill delivers there is a fixed charge plus £1.00 for each mile.
You can use the graph to find the total cost of having a parcel delivered by Bill.



(a) How much is the fixed charge?

£ 10 (1)

Ed uses a van to deliver parcels.
For each parcel Ed delivers it costs £1.50 for each mile.
There is no fixed charge.

(b) Compare the cost of having a parcel delivered by Bill with the cost of having a parcel delivered by Ed.

m	5	10	15	20	30	40	50
c	7.5	15	22.5	30	45	60	75

For any deliveries less than 20 miles
Ed is cheaper after 20 miles (3)

Bill is cheaper (Total 4 marks)

22

Sasha carried out a survey of 60 students.
She asked them how many CDs they each have.

This table shows information about the numbers of CDs these students have.

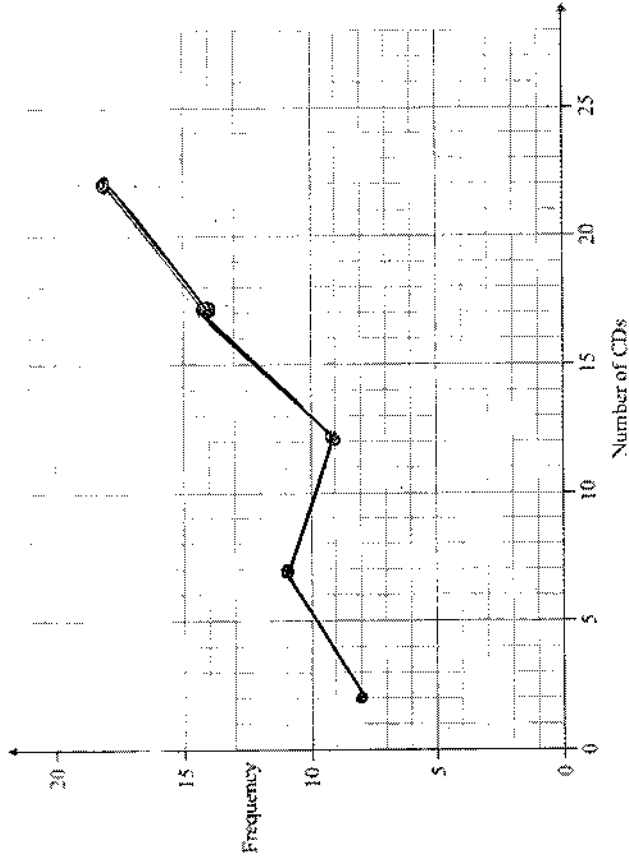
Number of CDs	0-4	5-9	10-14	15-19	20-24
Frequency	8	11	9	14	18

(a) Write down the class interval containing the median.

$$\frac{n+1}{2} = \frac{60+1}{2} = 30.5$$

15-19 (1)

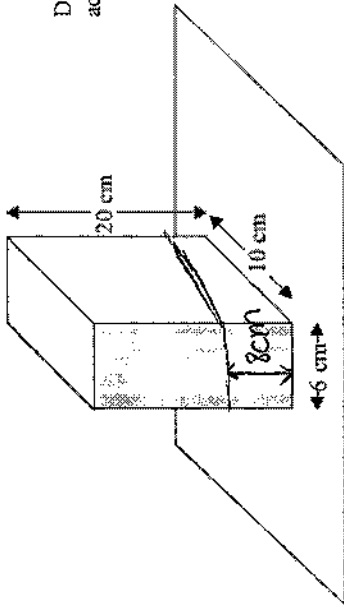
(b) On the grid, draw a frequency polygon to show the information given in the table.



(2) (Total 3 marks)

23

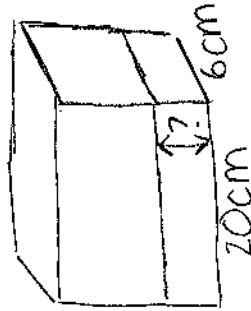
Jane has a carton of orange juice.
The carton is in the shape of a cuboid.



The depth of the orange juice in the carton is 8 cm.

Jane closes the carton.
Then she turns the carton over so that it stands on the shaded face.

Work out the depth, in cm, of the orange juice now.



$$6 \times 10 \times 8 = 480$$

$$20 \times 6 = 120$$

$$\frac{480}{120} = 4 \text{ cm}$$

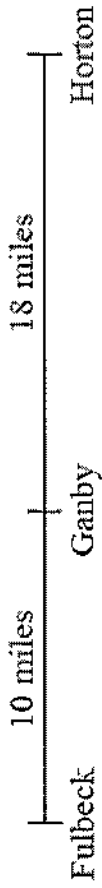
4

cm

(Total 3 marks)

24

The distance from Fulbeck to Ganby is 10 miles.
The distance from Ganby to Horton is 18 miles.



Raksha is going to drive from Fulbeck to Ganby.
Then she will drive from Ganby to Horton.

Raksha leaves Fulbeck at 10 00.
She drives from Fulbeck to Ganby at an average speed of 40 mph.

Raksha wants to get to Horton at 10 35.

Work out the average speed Raksha must drive at from Ganby to Horton.

$$\frac{10}{40} = 0.25 \text{ hrs so } 15 \text{ minutes}$$

Has to travel 18 miles in 20 mins

$$20 \text{ mins} = \frac{1}{3} \text{ of an hr}$$

$$18 \div \frac{1}{3} = 54$$

54

mph

(Total 3 marks)

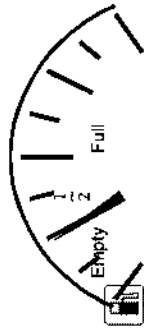
25

(a) Write down the value of 5^0



26

A petrol tank holds 48 litres of petrol when it is full.



The scale shows information about how much petrol there is in the petrol tank.

Work out the number of litres of petrol in the petrol tank.

$$\frac{48}{8} = 6$$

$$6 \times 2 = 12$$

$$\frac{1}{2} \dots\dots\dots (1)$$

(b) Write down the value of 2^{-1}

$$\frac{1}{2}$$

$$\frac{1}{2} \dots\dots\dots (1)$$

(Total 2 marks)

12 litres

(Total 2 marks)

27

Michael writes down 4 different factors of 60
He adds the 4 factors together.
He gets a number greater than 20 but less than 35

What 4 factors could Michael have written down?

Factors of 60

1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60,

eg 20, 1, 2, 3

(Total 3 marks)

28

Asif was asked to solve the equation $8x + 1 = 5$

Here is his working.

$$8x + 1 = 5$$

$$8x = 4$$

$$x = \frac{8}{4}$$

$$x = 2$$

Asif's answer is wrong.
What mistake did he make?

Should of $4 \div 8 = 0.5$

(Total 1 mark)

29

On 1st June, Brian has £312 in his bank account.

On 5th June he puts £120 into his bank account.

On 10th June he puts £25 into his bank account.

This is how much Brian spends from his bank account from 1st June to 15th June.

Supermarket £42.40
 Mobile phone bill £21.05
 Grocery shop £24.30
 Electricity bill £64.20
 Online book purchase £18.32
 Council tax £144.50
 Clothes £84.20
 Supermarket £51.35

} + 450.32

On 16th June, Brian wants to know how much money there is in his bank account.

Work out how much money there is in his bank account.

$$312 + 120 + 25 = 457$$

$$457 - 450.32 = 6.68$$

£ 6.68

(Total 4 marks)

30

Jim says,

"When you subtract a number from 10, the answer will always be less than 10"

(a) Is Jim correct?

You must give a reason with you answer.

No if you subtract a negative number it will go larger.
eg $10 - (-4) = 14$

(1)

Lucy says,

"When you halve a whole number that ends in 4, you always get a number that ends in 2"

(b) Write down an example to show that Lucy is wrong.

$$\frac{34}{2} = 17$$

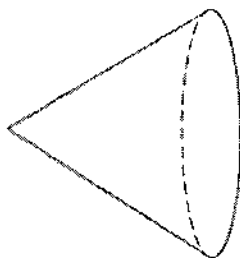
(1)

(Total 2 marks)

31

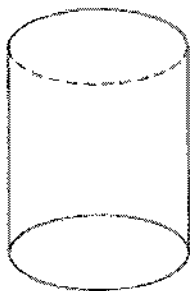
Write down the name of each of these two 3-D shapes.

(i)



(i) Cone

(ii)



(ii) cylinder

(Total 2 marks)

32

George and Harry work in a factory.

They use this rule to calculate their total pay in pounds.

Total pay = $8 \times$ number of hours worked + bonus

George worked 30 hours.

He was paid a bonus of £20

(a) Work out George's total pay.

$$8 \times 30 + 20$$

£ 260 (2)

Harry worked 34 hours.
His total pay was £300

(b) Work out the bonus that Harry was paid.

$$300 = 8 \times 34 + b$$

$$300 = 272 + b$$

$$300 - 272 = b$$

£ 28 (3)

(Total for Question 7 is 5 marks)

33

Tina collects eggs from her hens.
She labels their eggs small or medium or large.

20% of the eggs she collected in May were small.
24% of the eggs she collected in May were large.

(a) What percentage of the eggs she collected in May were medium?

$$20 + 24 = 44$$

$$100 - 44 = 56$$

$$56 \dots \dots \dots \% \quad (2)$$

(b) Express 24% as a fraction.
Give your fraction in its simplest form.

$$\frac{24}{100} = \frac{12}{50} = \frac{6}{25}$$

$$\frac{6}{25} \dots \dots \dots (2)$$

Tina collected 75 eggs in May.

(c) Work out 20% of 75.

$$10\% = 75 \div 10$$

$$= 7.5$$

$$20\% = 7.5 \times 2$$

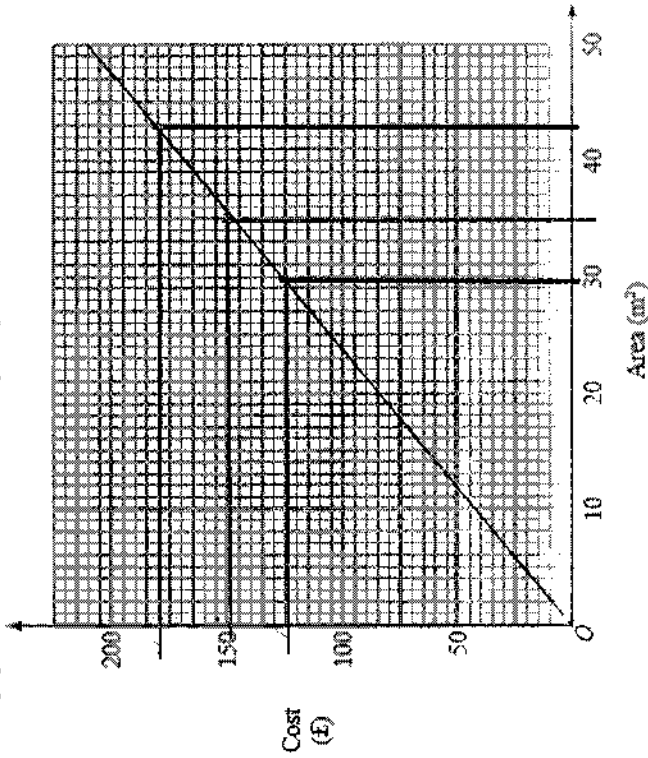
$$= 15$$

$$15 \dots \dots \dots (2)$$

(Total 6 marks)

34

John cleans carpets of different areas.
He uses this graph to work out the cost of cleaning a carpet.



A carpet has an area of 30 m².

(a) Use the graph to find the cost of cleaning this carpet.

$$£ 125 \dots \dots \dots (1)$$

It costs £150 to clean another carpet.

(b) Use the graph to find the area of this carpet.

$$35 \dots \dots \dots \text{m}^2 \quad (1)$$

A rectangular carpet has a length of 8.6 m.
It has a width of 5 m.

(c) Work out the cost of cleaning this carpet.

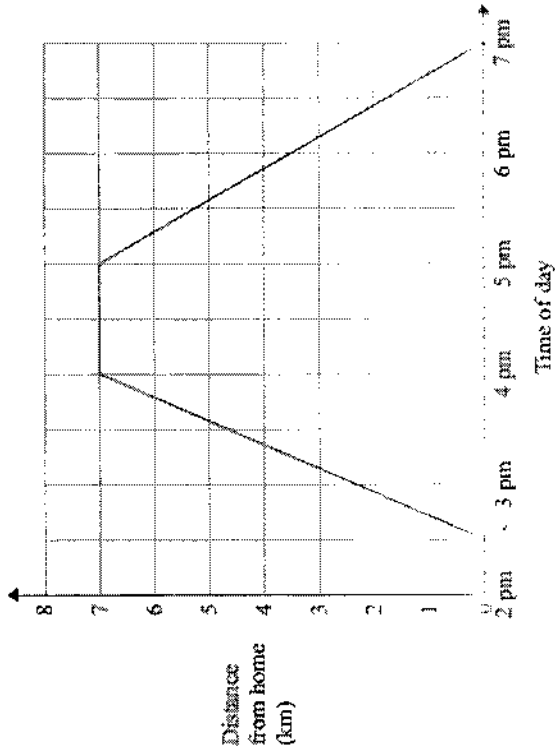
$$8.6 \times 5 = 43$$

$$£ 180 \dots \dots \dots (3)$$

(Total 5 marks)

35

Suha walked 7 km from her home.
She then had a rest.
Suha then walked home.
Here is Suha's travel graph.



(a) What time did Suha leave home?

2:30pm (1)

(b) How long did Suha rest for?

1 hr (1)

(c) What time did Suha start to walk home?

5pm (1)

(d) Work out the total time that Suha was away from home.

4.5 hours (1)

(Total 4 marks)

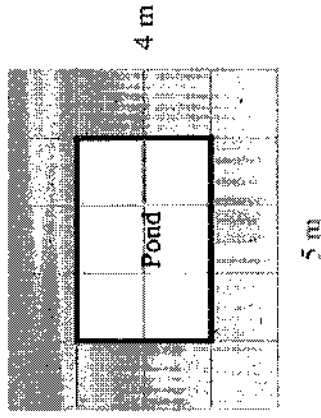
36

Priyesh has 12 square paving stones.
He will use all the stones to make a patio that is a rectangle.

(a) Draw a diagram to show how Priyesh can use these stones to make a patio that is a rectangle. (2)



The diagram shows a pond with a path around it.



(b) (i) Work out the perimeter of the pond.

10 m

(ii) Work out the area of the path.

14 m² (3)

(Total 5 marks)

37

A machine makes 36 trophies every hour.
 The machine makes trophies for $8\frac{1}{2}$ hours each day, on 5 days of the week.
 The trophies are packed into boxes.
 Each box holds 8 trophies.
 How many boxes are needed for all the trophies made each week?

$$36 \times 8.5 = 306$$

$$306 \times 5 = 1530$$

$$\frac{1530}{8} = 191.25$$

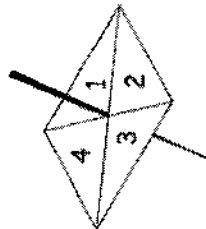
so 192 boxes

192
 (Total 4 marks)

Here is a four-sided spinner.

38

The spinner is biased.



The table shows the probabilities that the spinner will land on 1 or on 3

Number	1	2	3	4
Probability	0.2		0.1	

The probability that the spinner will land on 2 is the same as the probability that the spinner will land on 4
 (a) Work out the probability that the spinner will land on 4

$$0.2 + 0.1 = 0.3$$

$$1 - 0.3 = 0.7$$

$$\frac{0.7}{2} = 0.35$$

0.35
 (3)

Shunya is going to spin the spinner 200 times.
 (b) Work out an estimate for the number of times the spinner will land on 3

$$200 \times 0.35 = 70$$

70
 (2)
 (Total 5 marks)

39

Eric travels from the UK to India every year.

In 2010, the exchange rate was £1 = 67.1 rupees.

In 2012, the exchange rate was £1 = 82.5 rupees.

In 2010 Eric changed £600 into rupees.

How many pounds (£) did Eric have to change to rupees in 2012 to get the same number of rupees as he did in 2010?

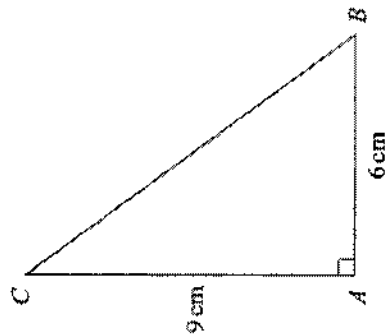
$$2010: 600 \times 67.1 = 40260$$

$$2012: \frac{40260}{82.5} = 488$$

£ 488

(Total 3 marks)

40



OT
rawn

ABC is a right-angled triangle.

$AB = 6$ cm.

$AC = 9$ cm.

Work out the length of BC .

Give your answer correct to 3 significant figures.

$$9^2 = 81 \quad 6^2 = 36$$

$$81 + 36 = 117$$

$$\sqrt{117} = 10.816$$

$$\underline{\underline{10.8}}$$

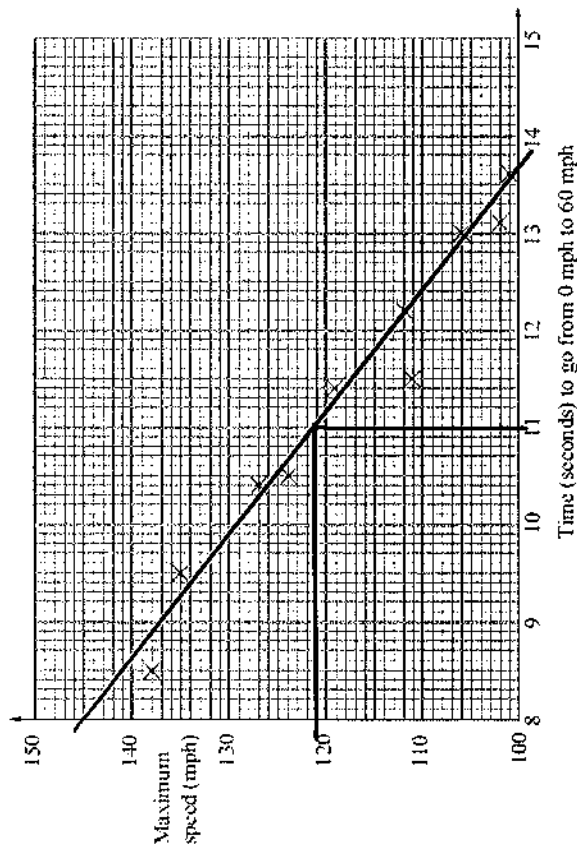
10.8

(Total 3 marks)

The scatter graph shows some information about 10 cars.

It shows the time, in seconds, it takes each car to go from 0 mph to 60 mph.

For each car, it also shows the maximum speed, in mph.



(a) What type of correlation does this scatter graph show?

Negative (1)

The time a car takes to go from 0 mph to 60 mph is 11 seconds.

(b) Estimate the maximum speed for this car.

Draw a line of best fit.

Answers between 118 and 123 mph (2)
(Total 3 marks)

Ali is planning a party.

He wants to buy some cakes and some sausage rolls.

The cakes are sold in boxes.
There are 12 cakes in each box.
Each box of cakes costs £2.50.

The sausage rolls are sold in packs.
There are 8 sausage rolls in each pack.
Each pack of sausage rolls costs £1.20.

Ali wants to buy more than 60 cakes and more than 60 sausage rolls.
He wants to buy exactly the same number of cakes as sausage rolls.

What is the least amount of money Ali will have to pay?

Cakes: 12, 24, 36, 48, 60, 72, 84

Sausage rolls: 8, 16, 24, 32, 40, 48, 56, 64, 72, 80.

72 in both lists so he needs 72 of each

$72 \div 12 = 6$ packets of cakes.

$6 \times £2.50 = £15.$

$72 \div 8 = 9$ packets of sausage rolls.

$9 \times £1.20 = £10.80$

Total = £15 + £10.80 = £25.80

(Total 5 marks)

The n th term of a sequence is $n^2 + 4$

Alex says

"The n th term of the sequence is always a prime number when n is an odd number."

Alex is wrong.

Give an example to show that Alex is wrong.

$$\begin{aligned} n=9 \quad n^2+4 &= 9^2+4 \\ &= 81+4 \\ &= 85. \end{aligned}$$

or

$$\begin{aligned} n=11 \quad n^2+4 &= 11^2+4 \\ &= 121+4 \\ &= 125. \end{aligned}$$

Both divide by 5 so they are not always prime.

(you need to have a sentence like this explaining why they're not prime)

(Total 2 marks)

Solve $x+2y=3$

$x-y=6$

$$\begin{array}{r} x+2y=3 \\ x-y=6 \\ \hline 3y=-3 \end{array}$$

$$y = -3 \div 3$$

$$y = -1.$$

$$\begin{array}{l} \text{Substitute into } x+2y=3 \\ x+2(-1)=3 \end{array}$$

$$x-2=3$$

$$x=3+2$$

$$x=5$$

$$x=5.$$

$$y=-1$$

(Total 3 marks)

You can do this by multiplying first, but as x has the same coefficient there's no need to multiply.

45

Colin, Dave and Emma share some money.

Colin gets $\frac{3}{10}$ of the money.

Emma and Dave share the rest of the money in the ratio 3 : 2.

What is Dave's share of the money?

Start with an amount of money.
 $\pounds 100$ is good because it relates
 to 100%.

$$\frac{3}{10} \text{ of } \pounds 100 = \pounds 100 \div 10 \times 3 \\ = \pounds 30.$$

$$\pounds 100 - \pounds 30 = \pounds 70 \text{ for Emma and Dave.}$$

$$3 + 2 = 5.$$

$$\pounds 70 \div 5 = \pounds 14$$

Dave's share is 2 parts
 $\pounds 14 \times 2 = \pounds 28$

$$= \frac{28}{100} \text{ or } 28\% \text{ or } 0.28$$

(Total 4 marks)

46

Here is a list of numbers.

2 4 5 6 7 8

From the list of numbers write down

(i) an odd number

5 or 7

(ii) a square number

4

(iii) a multiple of 3

6

(iv) a factor of 10

2 or 5.

(Total 4 marks)

A television programme started at 17 55
The programme was 1 hour 20 minutes long.

(i) At what time did the programme end?

1 hr 420 + 17 55

19 15

Mumtaz started to watch this programme at 18 34

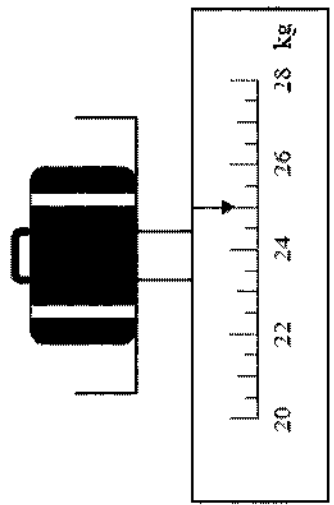
(ii) How many minutes of the programme did Mumtaz miss?

17 55) + 5 min
18 00) + 34 min
18 34

5 min + 34 min

39 minutes
(Total 3 marks)

Keith is going to catch a plane.
He weighs his bag on some scales.



(a) Write down the weight shown on the scales.

25 kg
(1)

There is an extra charge to pay when the weight of a bag is more than 23 kg.

The weight of Grant's bag is 19.5 kg.
He does **not** want to pay the extra charge.

(b) How much more weight can he put in the bag?

19.5
- 23.0

3.5

3.5 kg
(1)

Nina has two bags.

The weight of each bag is 20 kg.

1 kg = 2.2 pounds.

2 bags = 40 kg.

(c) What is the total weight of Nina's bags in pounds?

2.2 x 40 = 22 x 4

= 88 pounds
(3)

(Total 5 marks)

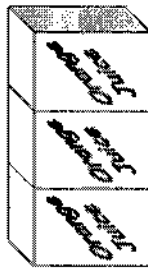
49

Rumana is going to take some children on a picnic.
She needs 26 cartons of orange juice.

Rumana can buy a single carton of orange juice for 38p.
She can buy a pack of 3 cartons for 90p.



single
carton
38p



3 cartons
90p

Rumana buys all the cartons she needs for the least possible amount of money.

How much did she spend?

$3 \times 8 = 24$ so buy 8 lots of 3 cartons ..

+ 2 singles

$$8 \times 90p = 720p$$

$$+ 2 \times 38p = 76p$$

$$\underline{720p + 76p} = 796p$$

(Total 5 marks)

50

Alan's wages are £240 each week.

He wants to save some money to buy a television.
The television costs £216

Alan is going to save 10% of his wages each week.

How many weeks will it take Alan to save enough money to buy the television?

$$10\% \text{ of } £240 = £24 \text{ saved per week.}$$

$$£216 \div £24$$

write as a fraction
and cancel down.

$$\frac{216}{24} = \frac{36}{4} = \frac{9}{1}$$

9 weeks.

(Total 4 marks)

Write these numbers in order of size.
Start with the smallest number.

$$70\% \quad \frac{2}{3}$$

$$0.62 \quad \frac{13}{20}$$

$$0.6$$

Change all to a fraction,
decimal or percentage.

$$70\% = 0.7$$

$$\frac{2}{3} = 0.6\bar{6}$$

$$0.62$$

$$\frac{13}{20} = 0.65$$

$$0.6$$

$$0.6, 0.62, \frac{13}{20}, \frac{2}{3}, 70\%$$

(Total 2 marks)

(a) Simplify fully

(i) $4d^2 - 6d^2 + 5d^2$

$$3d^2$$

(ii) $7x + 5y - 3x - 8y$

$$7x - 3x = 4x$$

$$5y - 8y = -3y$$

$$4x - 3y$$

(b) Solve $6x - 5 = 16$

$$6x = 16 + 5$$

$$6x = 21$$

$$x = 21 \div 6$$

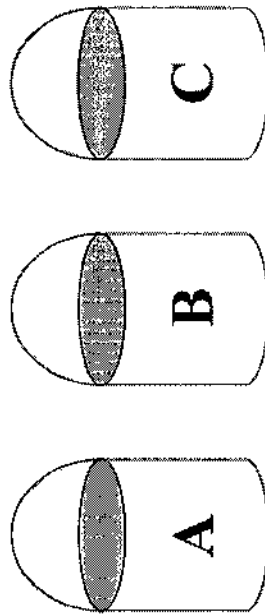
$$x = \frac{21}{6} = \frac{7}{2}$$

$$x = 3.5 \text{ or } \frac{7}{2}$$

(Total 5 marks)

53

Jason is collecting rainwater in buckets.



Buckets A, B and C are the same size.

Bucket A is $\frac{2}{3}$ full.

Bucket B is $\frac{3}{4}$ full.

Bucket C is $\frac{5}{6}$ full.

Is there enough rainwater in bucket C to pour into bucket A and B to fill them completely?
You must show all your working.

You need 2 full buckets.

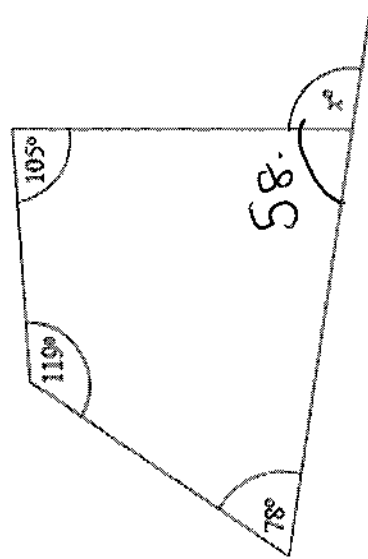
$$\frac{2}{3} + \frac{3}{4} + \frac{5}{6} = \frac{8}{12} + \frac{9}{12} + \frac{10}{12}$$

$$= \frac{27}{12} = 2\frac{3}{12}$$

Yes, there is more than enough
to fill them.

(Total 4 marks)

54



Work out the value of x .

Angles in a quadrilateral = 360

$$\begin{array}{r} 105 \\ + 119 \\ + 58 \\ \hline 302 \end{array}$$

$$\begin{array}{r} 360 \\ - 302 \\ \hline 58 \end{array}$$

Angles on a straight line = 180

$$\begin{array}{r} 180 \\ - 58 \\ \hline 122 \end{array}$$

$$x = 122^\circ$$

(Total 3 marks)

55

Peter goes for a walk.
He walks 15 miles in 6 hours.

- (a) Work out Peter's average speed.
Give your answer in miles per hour.

$$\text{Speed} = \frac{\text{Distance}}{\text{time}}$$

$= 15 \div 6$

$$= \frac{15}{6} = \frac{5}{2} = 2.5$$

$$= \frac{15}{6} = \frac{5}{2} = 2.5$$

2.5 mph
(2)

- (b) Is Sunita right?
You must show all your working.

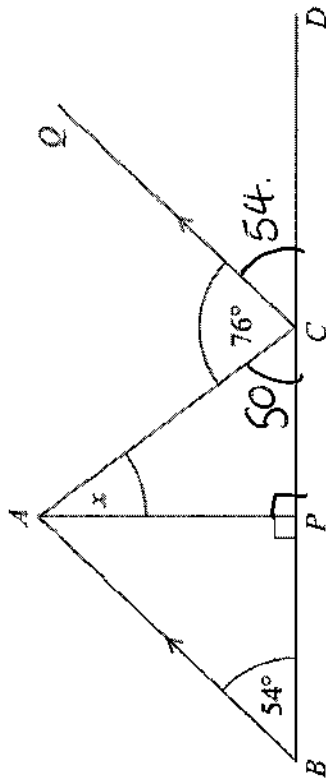
$$15 \text{ miles} = 8 \text{ km} \quad \downarrow \times 3$$

$$15 \text{ miles} = 24 \text{ km}$$

Yes has walked more than
20km.

(2)
(Total 4 marks)

56



BPCD is a straight line.
BA is parallel to CQ.
AP is perpendicular to BC.

Angle ABC = 54°
Angle ACQ = 76°

Work out the size of the angle marked x.
Give reasons for your answer.

$\angle CQD = 54^\circ$, corresponding angles are equal.

$$\begin{array}{r} 54 \\ + 76 \\ \hline 130 \end{array}$$

Angles on a straight line = 180°

$$\begin{array}{r} 180 \\ - 130 \\ \hline 50 \end{array}$$

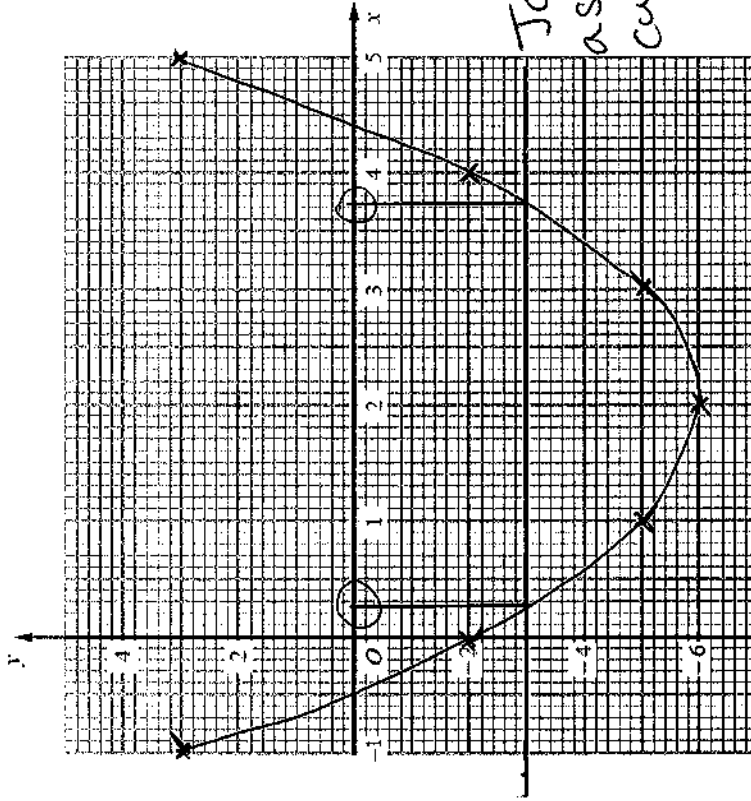
Angles in a triangle add upto 180°

$x = 40^\circ$ (Total 4 marks)

Complete the table of values for $y = x^2 - 4x - 2$

x	-1	0	1	2	3	4	5
y	3	-2	-5	-6	-5	-2	3

(b) On the grid, draw the graph of $y = x^2 - 4x - 2$



Join with a smooth curve.

(c) Use your graph to estimate the values of x when $y = -3$

$$x = 0.3$$

$$x = 3.6$$

(2)
(Total 6 marks)

The table shows some information about the average adult spending in 2008 as a percentage of average total adult spending in 2008.

Item	Percentage
food	11%
housing	11%
leisure	13%
clothes	5%
transport	14%
household goods	8%
other items	38%

In May 2008, Katie spent a total of £425.

She spent £48.45 of the £425 on food.

Compare the percentage that Katie spent on food with the average adult spending on food.

$$\frac{£48.45}{£425} \times 100 = 11.4\%$$

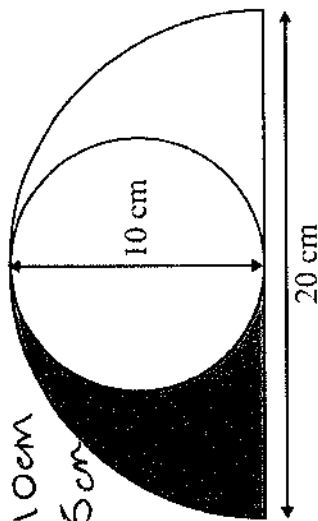
Very similar to the average

or

Slightly higher than average.

(Total 3 marks)

The diagram shows a circle inside a semicircle.



The circle has a diameter of 10 cm.
The semicircle has a diameter of 20 cm.

Work out the area shaded.

Give your answer correct to 1 decimal place.

$$\text{Circle area} = \pi \times 5^2 = 25\pi - \text{Dont round.}$$

$$\text{Semi circle area} = \frac{1}{2} \times \pi \times 10^2 = 50\pi.$$

$$50\pi - 25\pi = 25\pi$$

$$\frac{25\pi}{2} = 12.5\pi \text{ or } 39.2699\dots$$

$$39.3$$

cm²

(Total 5 marks)

Chris works in a cafe.

At noon one day he records the number of customers sitting at each table in the cafe.

Here are his results.

Number of customers sitting at a table	Number of tables
0	4
1	5
2	10
3	7
4	3
5	1

(a) Work out the total number of tables in the cafe.

$$4 + 5 + 10 + 7 + 3 + 1$$

$$30$$

(1)

(b) Work out the total number of customers sitting at tables in the cafe.

customers $\times$ tables

and add up.

$$63$$

(2)

(c) Work out the mean number of customers sitting at a table.

Total customers $\div$ total tables

$$63 \div 30.$$

$$2.1$$

(2)

(Total 5 marks)

There are only red beads and green beads in a bag.
The ratio of the number of red beads to the number of green beads is 5 : 9

(a) What fraction of the beads are red?

$$\frac{R}{5} : \frac{G}{9}$$

$$\frac{5}{14} \quad (1)$$

There is a total of 84 beads in the bag.

(b) How many of the beads are green?

$$5 + 9 = 14 \quad \left\{ \begin{array}{l} 6 \times 9 = 54 \\ 84 \div 14 = 6 \end{array} \right.$$

Susie is going to put some more beads in the bag.
There will still be only red beads and green beads in the bag.

Susie wants to have twice as many green beads as red beads in the bag

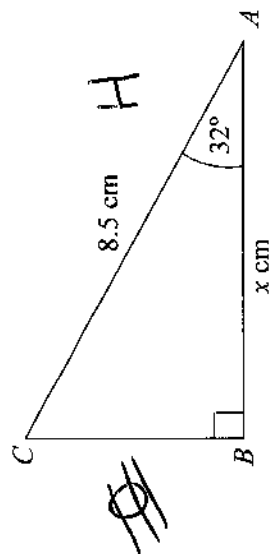
(c) What beads should she put in the bag?
You must explain your answer.

$$\frac{R}{5} : \frac{G}{9} \rightarrow \frac{R}{30} : \frac{G}{54} \times 6$$

+ 6 more green

(3)
(Total 7 marks)

ABC is a right-angled triangle.



Work out the value of x .

Give your answer correct to 1 decimal place.

$$\frac{S}{C} = \frac{O}{H} = \frac{T}{A}$$

$$\cos(32) = \frac{x}{8.5}$$

$$8.5 \cos(32) = x$$

$$7.208408817 = x$$

$$7.2 \text{ cm}$$

(Total 2 marks)

63

Tanya needs to buy chocolate bars for all the children in Year 7.
Each of the 130 children get one chocolate bar.

There are 8 chocolate bars in each packet.

Work out the least number of packets of chocolate bars that Tanya needs to buy.

$$\begin{array}{r} 016.2 \\ 8 \overline{) 130.20} \end{array}$$

as it is a decimal you will need
to buy another pack

17

(Total is 3 marks)

64

Paul organised an event for a charity.

Each ticket for the event cost £19.95
Paul sold 395 tickets.

Paul paid costs of £6000
He gave all money left to the charity.

(a) Work out an estimate for the amount of money Paul gave to the charity.

$$£20 \times 400 = £8000$$

$$\begin{array}{r} £8000 \\ - £6000 \\ \hline £2000 \end{array}$$

£2000

(b) Is your answer to (a) an underestimate or an overestimate?
Give a reason for your answer.

Overestimate, as 19.95 was
rounded up & 395 was also
rounded up.

(1)

(Total is 4 marks)

Jane made some almond biscuits which she sold at a fete.

She had:

5 kg of flour
3 kg of butter
2.5 kg of icing sugar
320 g of almonds

Here is the list of ingredients for making 24 almond biscuits.

Ingredients for 24 almond biscuits

150 g flour
100 g butter
75 g icing sugar
10 g almonds

Jane made as many almonds biscuits as she could, using the ingredients she had.

Work out how many almond biscuits she made.

① Change all the kg to g.

$$\begin{array}{l} \text{Flour } 5000\text{g} \div 150\text{g} = 33.3 \\ \text{butter } 3000\text{g} \div 100\text{g} = 30 \\ \text{icing sugar } 2500\text{g} \div 75\text{g} = 33.3 \\ \text{almonds } 320\text{g} \div 10\text{g} = 32 \end{array}$$

10 is the biggest amount
 $30 \times 24 = 720$

 (Total is 3 marks)

Jan writes down

one multiple of 9
and two different factors of 40

Jan adds together her three numbers.
Her answer is greater than 20 but less than 30

Find three numbers that Jan could have written down.

Multiple of 9

9 18 ~~27~~ ~~36~~ ~~45~~ ~~54~~ ~~63~~ ~~72~~ ~~81~~ ~~90~~

Factor of 40

1 2 4 5

8 10 ~~20~~ ~~40~~

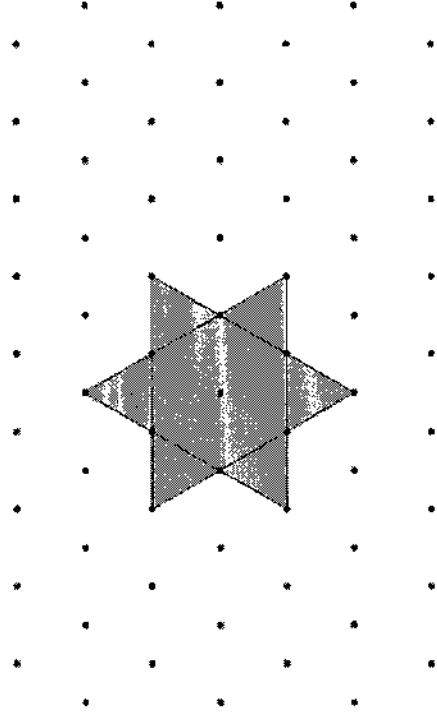
*Multiple answers *

eg $9 + 8 + 5 = 22$

$18 + 1 + 8 = 27$

(Total is 3 marks)

Here is a star shape.



The star shape is made from a regular hexagon and six congruent equilateral triangles.
The area of the star shape is 96 cm^2 .

Work out the area of the regular hexagon

If you folded the stars in
it would make the hexagon.
 $\therefore$ it would be $\frac{1}{2}$ the area!

$$96 / \frac{1}{2} = 192 \text{ cm}^2$$

(Total is 2 marks)

Sam buys 20 boxes of oranges.
There are 25 oranges in each box.

$\Rightarrow 500$ oranges

Each box of oranges costs £7

$\Rightarrow 20 \times £7 = £140$

Sam sells $\frac{2}{5}$ of the oranges he bought.

Sells

$\frac{2}{5}$ of 500 = 200

Not sold = 300

He sells each of these oranges for 40p.

He then sells all of the remaining oranges at 3 oranges for 50p.

Did Sam make a profit or did Sam make a loss?
You must show working to justify your answer.

$$200 \times 40p = \underline{\underline{£80}}$$

$$3 \text{ oranges for } 50p \Rightarrow 100 \text{ times}$$

$$100 \times 50p = \underline{\underline{£50}}$$

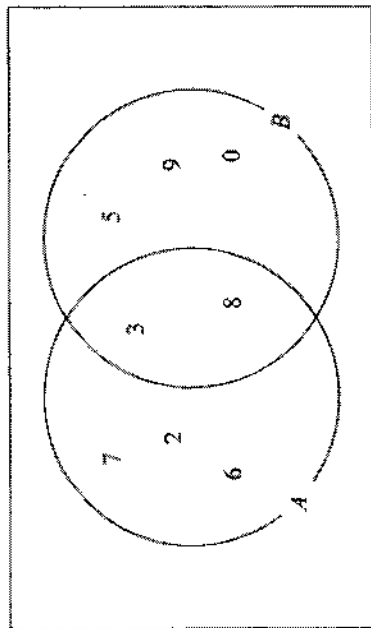
$$£80 + £50 = \underline{\underline{£130}}$$

He made a £10 Loss

(Total is 5 marks)

69

Here is a Venn diagram.



(a) Write down all the numbers in set A.

2, 3, 6, 7, 8

(b) Write down the numbers that are in set $A \cap B$.

38

(1)
(Total 3 marks)

70

Here are four digits.

8 2 4 3

(a) (i) Use two of these digits to make the smallest possible two-digit number.

23

(ii) Use three of these digits to make the three-digit number closest to 300.

284

(2)

Here are four different digits.

5 1 7 9

(b) (i) Put one digit in each box to make the largest total.
You may only use each digit once.

eg

7

1

 +

9

5

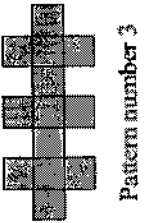
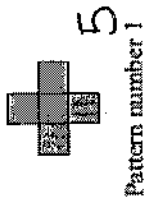
(ii) Write down the total.

166

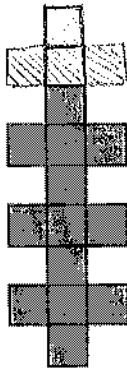
(2)
(Total 4 marks)

71

Here are some patterns made from squares.



(a) The diagram below shows part of Pattern number 4. Complete the diagram for Pattern number 4



Pattern number 4

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of squares	5	9	13	17	21

(c) Find the number of squares used for Pattern number 10

$$n^{\text{th}} \text{ term}$$

$$4n + 1$$

$$4 \times 10 + 1 = 41$$

(Total 3 marks)

72

Two numbers are added together.
The answer is 15

Both the numbers are factors of 24

What are the two numbers?

Factors of 24

1 2 3 4

6

12

24

now which 2 + to get 15

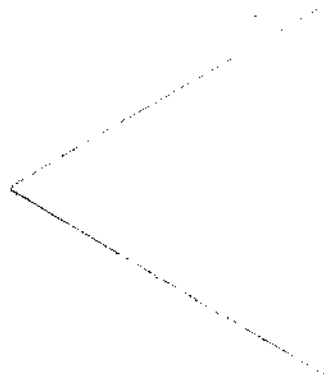
$$12 + 3 = 15$$

12 and 3

(Total 2 marks)

73

Make an accurate drawing of an equilateral triangle of side length 5 cm.



(Total 2 marks)

74

Here are three calculations.

①

The sum of 14 and 19

②

The product of 9 and 4

③

The difference between 57 and 29

Which of these calculations has the biggest answer?
You must show how you got your answer.

$$\textcircled{1} \quad 14 + 19 = 33$$

$$\textcircled{2} \quad 57 - 29 = 28$$

$$\textcircled{3} \quad 9 \times 4 = 36$$

the product of 9×4

(Total 3 marks)

75

Here is a bus timetable from a Park and Ride car park to a town centre.

Car park	Town centre
0740	0752
0800	0812
0815	0827
then every 15 minutes until	
1815	1827

Sadia gets to the car park at 0745.
She catches the next bus to the town centre.

(a) What time should the bus get to the town centre?

08:12 (1)

Here is the bus timetable from the town centre to the car park.

Town centre	Car park
0800	0815
0835	0847
0902	0914
0920	0932
then every 15 minutes until	
1920	1932

(b) How many buses go from the town centre to the car park between 0800 and 1000?

9:20 9:50 6 (2)
9:35 ~~10:05~~

Paul wants to leave the town centre after 1730.
He is going to catch a bus to the car park.

(c) What is the time of the first bus Paul can catch from the town centre after 1730?

10:05 11:05 12:05 13:05 17:35 (1)
10:20 17:35 (Total 4 marks)
10:35 17:35
10:50

76

A charity made an appeal for money.

The charity put the information shown below on a poster.

Hunger appeal

- £3 will buy 5 meals for one person.
- £100 will buy lunches for 80 school children for 5 days.

£3 will buy 5 meals for one person.

(a) Work out the cost of one of the meals.
Give your answer in pence.

$$\frac{£3}{5} = 0.6 \Rightarrow 60p$$

60 (2)

£100 will buy lunches for 80 school children for 5 days.

(b) Work out the cost of buying lunch for one school child for one day.

$$\frac{£100}{5} = £20 \text{ per day!}$$

$$\frac{£20}{80} = \frac{1}{4} \Rightarrow 0.25 \Rightarrow 25p$$

25p (3)
(Total 5 marks)

77

A, B, C and D are points on a straight line.
 $AD = 20$ cm
 $AB = 8.6$ cm
 $BC = CD$

Work out the length of BC.

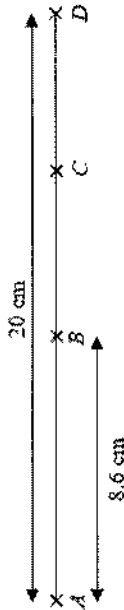


Diagram NOT
accurately drawn

$$20 - 8.6 = 11.4$$

$$\frac{11.4}{2} = 5.7$$

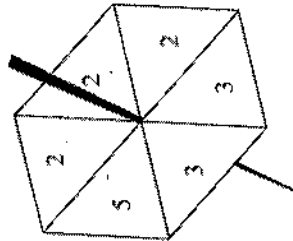
$$8.6 + 5.7 + 5.7 = 20$$

$$5.7 \text{ cm}$$

(Total 3 marks)

78

Meela has a fair 6-sided spinner.
 The sides of the spinner are numbered 2, 2, 2, 3, 3, 5.



Meela spins the spinner once.

(a) Which number is the spinner least likely to land on?

$$2 = \frac{3}{6}$$

$$3 = \frac{2}{6}$$

$$5 = \frac{1}{6}$$

5

(1)

(b) From the following list, choose the word that best describes the likelihood that the spinner will land on 2.



impossible

unlikely

likely

certain

Evens

(1)

(c) Write down the probability that the spinner will land on 3.

$$\frac{2}{6}$$

$$\frac{1}{3}$$

(2)

(Total 4 marks)

Tom is going to buy 25 plants to make a hedge.

Here is information about the cost of buying the plants.

Kirsty's Plants £2.39 each

Hedge World Pack of 25 £52.50 plus VAT at 20%
--

Tom wants to buy the 25 plants as cheaply as possible.

Should Tom buy the plants from Kirsty's Plants or from Hedge World?
You must show all your working.

Kirsty

$$£2.39 \times 25 = \underline{\underline{£59.75}}$$

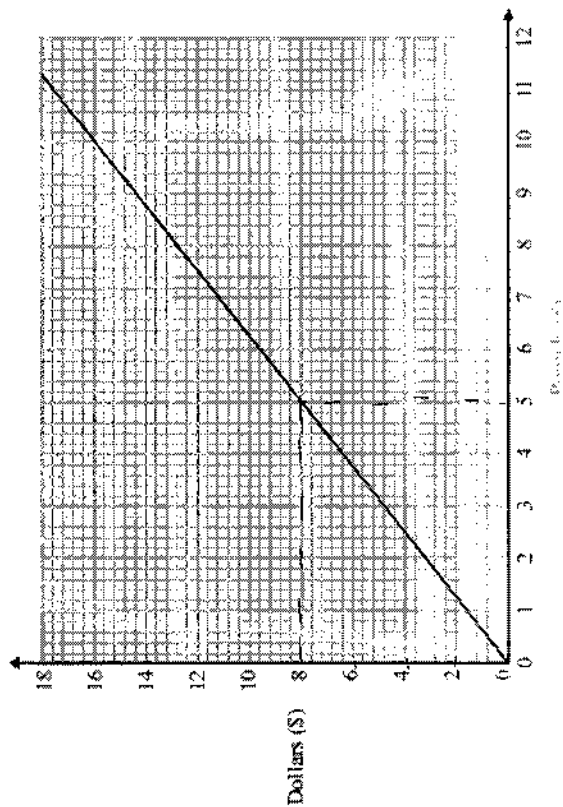
Hedge

$$52.50 \times 1.20 = \underline{\underline{£63.00}}$$

Kirsty would be the best value

(Total 5 marks)

You can use this conversion graph to change between pounds (£) and dollars (\$).



(a) Use the conversion graph to change £5 to dollars.

\$ 8 (1)

Ella has \$200 and £800
Her hotel bill is \$600

Ella pays the bill with the \$200 and some of the pounds.

(b) Use the conversion graph to work out how many pounds she has left.
\$600 - \$200 = \$400 left to pay.

$$\begin{array}{l} \times 20 \\ \text{£5 : £8} \end{array} \begin{array}{l} \times 50 \\ \text{£250 : £400} \end{array}$$

£ 550 (4)
(Total 5 marks)

$$£800 - £250 = \underline{\underline{£550}}$$

Dylan is driving from London to Newcastle.
He will drive a total distance of 240 miles.

Dylan leaves London at 09:30

It takes him $1\frac{1}{2}$ hours to travel the first 90 miles.

- (a) Use this information to estimate the time Dylan will arrive in Newcastle.
You must show how you get your answer.

$$\text{Time } 1.5 \text{ hrs}$$

$$\text{Dist } 90 \text{ miles}$$

$$\text{Speed} = \frac{\text{Dist}}{\text{Time}}$$

$$\text{Speed} = \frac{90}{1.5}$$

$$\text{Speed} = 60 \text{ mph}$$

$$\text{Total dist} = 240 \text{ miles}$$

$$\text{Total time} = \frac{\text{tot. dist}}{\text{Speed}}$$

$$\text{total time} = \frac{240}{60}$$

$$\text{total time} = 4 \text{ hrs}$$

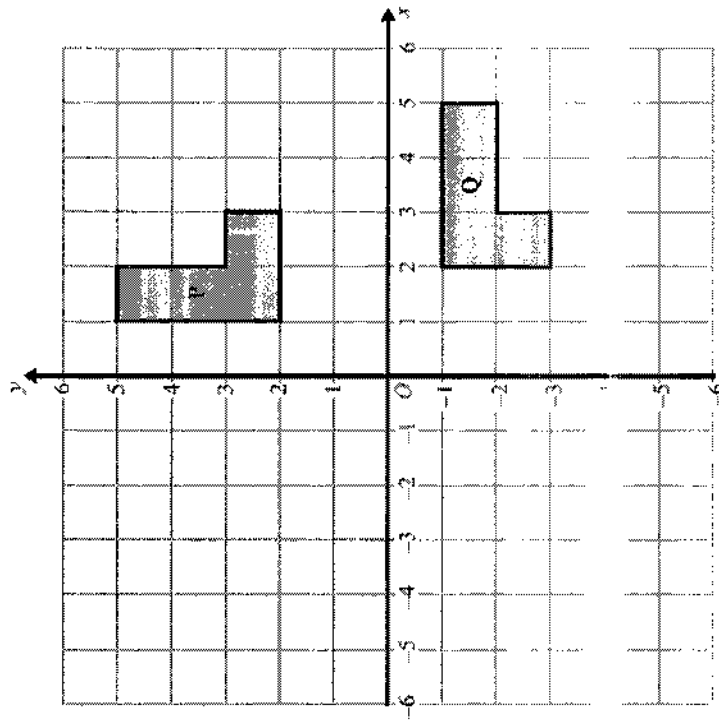
$$\therefore 09:30 + 4 \text{ hrs}$$

Dylan will arrive at 13:30
in Newcastle (3)

- (b) Write down one assumption you made in your answer to part (a).
If your assumption is wrong, how would this affect your answer to part (a)?

Driving at a constant speed
If Dylan faced traffic delays
or stopped during the journey
then this would delay his
arrival.
Make his journey time
longer. (1)

(Total 4 marks)

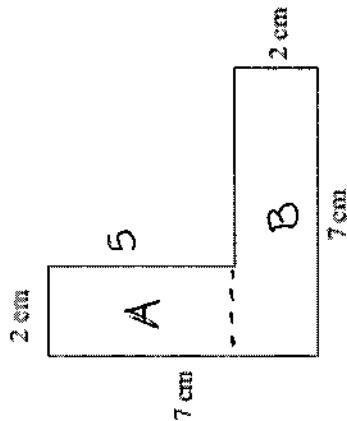


Describe fully the single transformation that maps shape P onto shape Q.

Rotation
90° clockwise
centre (0,0)

(Total 3 marks)

83



The diagram shows the cross-section of a solid prism.
The length of the prism is 2 m.

The prism is made from metal.
The density of the metal is 8 grams per cm^3 .

Work out the mass of the prism.

$$\begin{aligned} \text{Area of cross section} \\ \text{Area of A} &= 5 \times 2 \\ &= 10 \text{ cm}^2 \end{aligned}$$

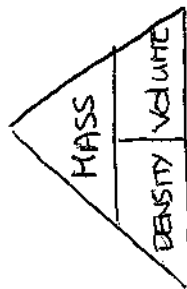
$$\begin{aligned} \text{Area of B} &= 7 \times 2 \\ &= 14 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Total area} &= 10 + 14 \\ &= 24 \text{ cm}^2 \end{aligned}$$

Volume of solid

$$24 \times 200 = 4800 \text{ cm}^3$$

$$2\text{m} = 200\text{cm}$$



$$\text{mass} = \text{density} \times \text{volume}$$

$$\text{mass} = 8 \times 4800$$

$$\text{mass} = 38400\text{g}$$

$$38400\text{g}$$

(Total 5 marks)

84

The probability that the coin will land on a Head is 0.37

(a) Write down the probability that the coin will land on a Tail.

$$P(\text{HEAD}) = 0.37$$

$$\begin{aligned} P(\text{TAIL}) &= 1 - 0.37 \\ &= 0.63 \end{aligned}$$

$$0.63$$

(1)

Ramesh is going to throw the coin 500 times.

(b) Work out an estimate for the number of times that the coin will land on a Head.

$$500 \times 0.37$$

$$185$$

(2)

(Total 3 marks)

85

Arwen buys a car for £4000

The value of the car depreciates by 10% each year.

Work out the value of the car after two years.

$$100\% - 10\% = 90\%$$

$$90\% = 0.9$$

$$4000 \times 0.9^2$$

$$\underline{\underline{£3240 \text{ ANS}}}$$

OR.

$$\text{Year 1 } 10\% \text{ of } £4000 = £400$$

$$£4000 - £400 = £3600$$

$$\text{Year 2 } 10\% \text{ of } £3600 = £360$$

$$£3600 - £360 = £3240$$

£ 3240

(Total 3 marks)

86

Write the following numbers in order of size.
Start with the smallest number.

$$0.038 \times 10^2 \quad 3800 \times 10^{-4} \quad 380 \quad 0.38 \times 10^{-1}$$

$$0.038 \times 10^2 = 3.8 \quad \textcircled{3}$$

$$3800 \times 10^{-4} = 0.38 \quad \textcircled{2}$$

$$380 \quad \textcircled{4}$$

$$0.38 \times 10^{-1} = 0.038 \quad \textcircled{1}$$

$$0.38 \times 10^{-1}, 3800 \times 10^{-4}, 0.038 \times 10^2, 380$$

(Total 2 marks)

There are 18 packets of sweets and 12 boxes of sweets in a carton.

The mean number of sweets in all the 30 packets and boxes is 14.

The mean number of sweets in the 18 packets is 10.

Work out the mean number of sweets in the boxes.

$$\text{mean} = \frac{\text{total amount}}{\text{number of items}}$$

$$14 = \frac{\text{tot amt}}{30}$$

$$\begin{aligned} \text{tot. amt} &= 14 \times 30 \\ &= 420 \text{ sweets.} \end{aligned}$$

Packets

$$10 = \frac{\text{tot. amt in pkts}}{18}$$

$$\begin{aligned} \text{tot amt in pkts} &= 10 \times 18 \\ &= 180 \text{ sweets.} \end{aligned}$$

Number of sweets
in boxes =
Total amount of sweets
- amt. of sweets in
packets

$$420 - 180 = 240$$

Boxes

$$\text{Mean} = \frac{240}{12}$$

$$\text{Mean} = 20$$

20 sweets.

(Total 3 marks)

$$\begin{array}{r} 898.50 \\ - 860.79 \\ \hline 37.71 \end{array}$$

Janet sends parcels by Parcel Express.

The table shows information about the cost of sending a parcel by Parcel Express.

Parcel Express	
Weight range	Cost
Less than 2 kg	£3.80
2 kg to less than 5 kg	£5.99
5 kg to 10 kg	£7.14

The table below gives information about the numbers and weights of the parcels Janet sent in April and in May.

Number of parcels			
Weight range	April	May	TOTAL
Less than 2 kg	23	21	44
2 kg to less than 5 kg	28	27	55
5 kg to 10 kg	19	32	51
			150

Janet could have sent her parcels by Parcels R Go.

The table below shows information about the cost of sending a parcel by Parcels R Go.

Parcels R Go	
Weight range	Cost
0-15 kg	£5.99

Janet thinks that it would have been cheaper to send all her parcels by Parcels R Go.

Is Janet right?

You must show your working.

Parcel Express

$$£3.80 \times 44 = £167.20$$

$$£5.99 \times 55 = £329.45$$

$$£7.14 \times 51 = £364.14$$

$$£860.79$$

$$898.50$$

$$- 860.79$$

$$37.71$$

(Total 5 marks)

Because it is £37.71 cheaper

Parcels are 60

$$150 \times £5.99 =$$

$$£898.50$$

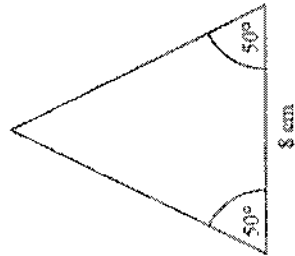
No Janet is

wrong. She

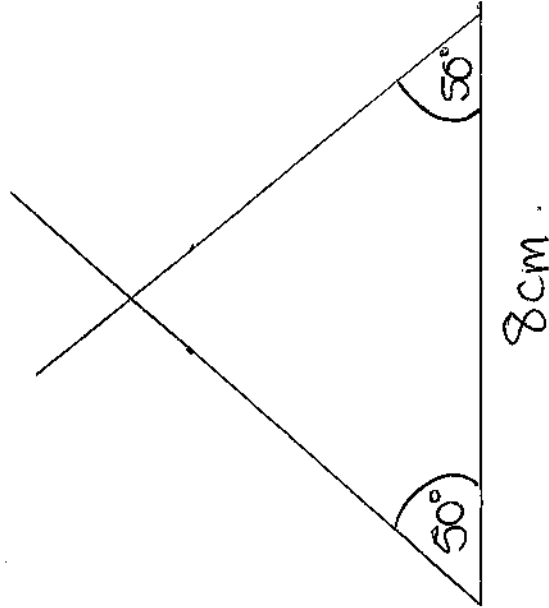
should used

Parcel Express

Here is a sketch of the end of a roof of a toy house.



Draw an accurate diagram of the end of the roof.



(Total 2 marks)

On the probability scale, mark with a cross (x), the probability that

- (i) you will have something to drink tomorrow.
Label this cross A.

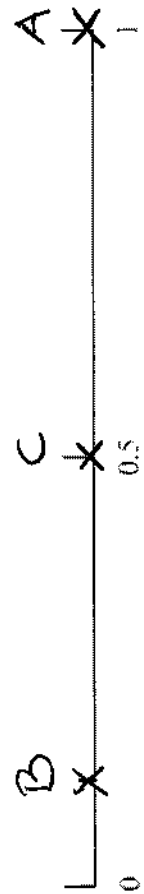
certain

- (ii) a teacher chosen at random was born on a Monday.
Label this cross B.

$\frac{1}{7}$

- (iii) a fair 6-sided dice will show an even number when thrown.
Label this cross C.

$\frac{3}{6} = \frac{1}{2}$



(Total 3 marks)

Jason collected some information about the heights of 19 plants.
This information is shown in the stem and leaf diagram.

1	1	2	3	4	5
2	3	3	3	3	3
3	0	3	2	3	3
4	1	1	1	1	1

Key: 4|8 means 48 mm

Find the median.

30 mm
(Total 2 marks)

Some of the land in the Netherlands is used to grow bulbs.
The table shows the percentages of this land used to grow the different types of bulbs.

Type of bulb	Hyacinth	Tulip	Daffodil	Lily	Other
Percentage	8%	50%	12%	x%	7%

(a) Work out the value of x.

$$100\% - 77\%$$

$$\begin{array}{r} 8 \\ 50 \\ 12 \\ + 17 \\ \hline 77 \end{array}$$

$$x = 23 \quad (1)$$

The area of land used to grow bulbs for hyacinths is 1200 hectares.

(b) Work out the area of land used to grow bulbs for daffodils.

$$\begin{array}{r} 8\% = 1200 \text{ hectares} \\ 4\% = 600 \text{ hectares} \\ \hline 12\% = 1800 \text{ hectares} \end{array} \quad \underline{\text{ANS}}$$

$$\begin{array}{l} \text{OR} \\ 8\% = 1200 \text{ hectares} \\ 1\% = \frac{1200}{8} \\ 1\% = 150 \\ 12\% = 150 \times 12 = 1800 \end{array}$$

1800 hectares
(2)
(Total 3 marks)

93

Hint use letters

Barbara has a tube of sweets.

There are 5 sweets in the tube.

There is one sweet of each of these colours in the tube.

red blue green yellow pink

Barbara takes two sweets at random from the tube.

(a) Write down all the possible combinations of colours she can take.

RB

RG BG

RY BY GY

RP BP GP YP

(10 outcomes)

(2)

(b) What is the probability that Barbara takes a red sweet and a yellow sweet from the tube?

$\frac{1}{10}$

$\frac{1}{10}$

$\frac{1}{10}$

(1)

(Total 3 marks)

94

Ali takes his car to a garage.
The car has a 5000 mile service.
It also has an MOT test.

Costs

5000 mile service £79 plus VAT at 20%

10 000 mile service £99 plus VAT at 20%

MOT test £39 plus VAT at 20%

(a) Work out Ali's total bill.

$$£79 \times 1.20 = £94.80$$

$$£99 \times 1.20 = £118.80 +$$

$$£39 \times 1.20 = £46.80$$

$$\underline{141.60}$$

£ 141.60

(3)

Ali bought his car for £20 000

The car depreciated by 20% the first year.

The car depreciated by 10% the second year.

(b) Work out the value of the car at the end of the second year.

$$20\% \text{ of } 20000 = 4000$$

$$20000 - 4000 = 16000$$

$$10\% \text{ of } 16000 = 1600$$

$$16000 - 1600 = 14400$$

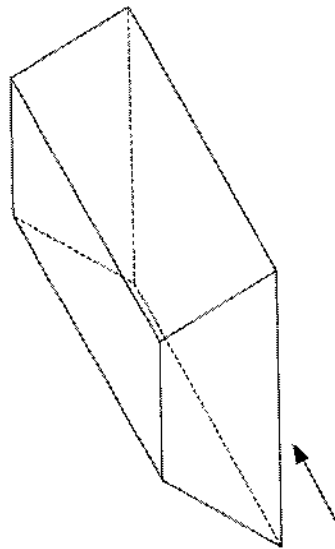
$$16000 - 1600 = 14400$$

$$16000 - 1600 = 14400$$

£ 14400

(3)

(Total 6 marks)



The diagram shows a prism.

In the space below, sketch the front elevation from the direction marked with an arrow.



(Total 2 marks)

Becky says,

"When you square a prime number you always get an odd number."

(a) Write down an example to show that Becky is wrong.

$$2^2 = 2 \times 2 = 4 \text{ which is even} \quad (1)$$

James says,

"When you cube any negative number you always get a negative number."

(b) James is right. Explain why.

negative number $\times$ negative number

= positive number

positive number $\times$ negative number

= negative number.

OR

(negative $\times$ negative) $\times$ negative number
 (number) positive number ⁽²⁾

(Total 3 marks)

positive number $\times$ negative number
 = negative number

There are some blue counters, red counters and green counters in a bag.

There are twice as many blue counters in the bag as red counters in the bag.

There are 3 times as many red counters in the bag as green counters in the bag.

For the counters in the bag, write down the ratio of

the number of blue counters to the numbers of red counters to the number of green counters.

BLUE = $2 \times$ RED

RED = $3 \times$ GREEN

$\therefore$ GREEN is SMALLEST

Let green have one box.

--	--	--	--	--	--	--	--

BLUE

--	--	--

RED

--

GREEN

B : R : G

6 : 3 : 1

6 : 3 : 1

(Total 2 marks)

Lev writes down the following

$$\frac{2}{3} + \frac{5}{8} = \frac{7}{11}$$

Without doing the exact calculation, explain why Lev's answer cannot be correct.

Lev has just added the numerators (top numbers) together and

just added the denominators (bottom numbers) together.

He should have a common denominator

(Total 1 mark)

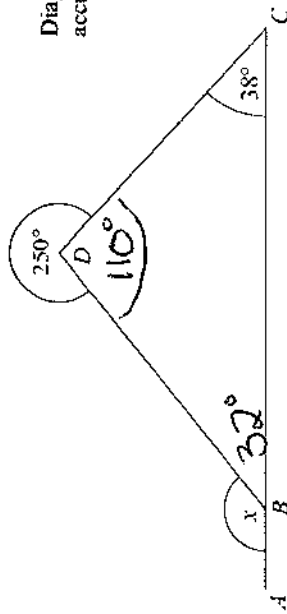


Diagram NOT
accurately drawn

ABC is a straight line.
Angle $BCD = 38^\circ$
The reflex angle $BCD = 250^\circ$

Work out the size of the angle marked x .
Give reasons for your answer.

$$\begin{aligned} \hat{BDC} &= 360^\circ - 250^\circ \\ &= 110^\circ \end{aligned}$$

Angles in a $\triangle$ add
up to 180°

$$110^\circ + 38^\circ = 148^\circ$$

$$180^\circ - 148^\circ = 32^\circ$$

$$\hat{DBC} = 32^\circ$$

Angles on a straight line add up
to 180°

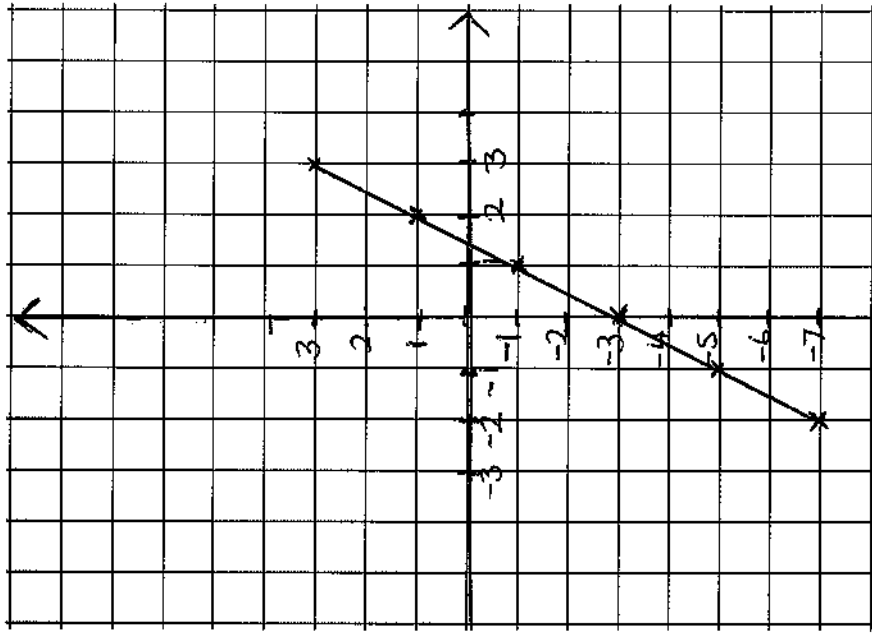
$$180^\circ - 32^\circ = 148^\circ$$

$$x = 148^\circ$$

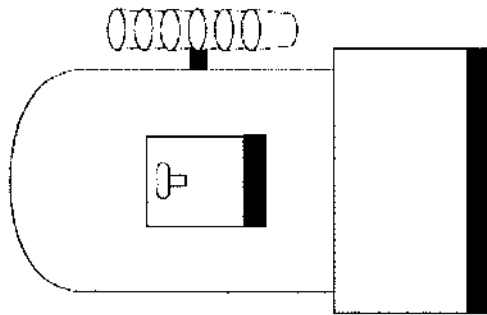
(Total 4 marks)

On the grid, draw the graph of $y = 2x - 3$ for values of x from -2 to 3

x	-2	-1	0	1	2	3
y	-7	-5	-3	-1	1	3



(Total 4 marks)



A water container has 19.5 litres of water in it.
A cup holds 210 ml of water.

At most 92 cups can be filled completely from the water container.

Explain why.

You must show all your working.

$$19.5 \text{ litres} = 19500 \text{ ml}$$

$$19500 \div 210 = 92.8571 \dots$$

You can only fill 92 cups completely

$$\begin{array}{r} 210 \times 92 = 19320 \text{ ml} \\ + 210 \\ \hline 19530 \end{array}$$

You would need another 30mls (Total 3 marks)
to fill up another full cup.

There are a total of 120 counters in a box.

There are only red counters and blue counters in the box.

There are three times as many red counters as blue counters in the box.

$$R:B \\ 3:1$$

Carl takes $\frac{1}{3}$ of the red counters from the box.

Kerry takes 80% of the blue counters from the box.

Work out the ratio of the number of red counters to the number of blue counters now in the box.

Give your ratio in its simplest form.

There are 90 red and 30 blue counters

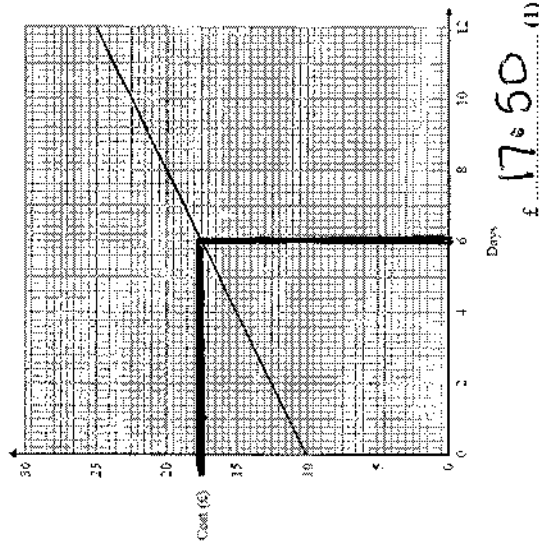
Carl takes $\frac{1}{3}$ of 90 = 30 red

Kerry takes 80% of 30 = 24 blue

$$\begin{array}{r} \text{Red} : \text{Blue} \\ 90 - 30 \quad 30 - 24 \\ \hline \div 6 \quad 60 : 6 \quad 6 \div 6 \\ 10 : 1 \end{array}$$

Salome hires a chainsaw from the Saws are Us company.

This graph shows the cost of hiring a chainsaw from Saws are Us for up to 12 days.



- (a) Find the cost of hiring the chainsaw for 6 days from Saws are Us.

The cost of hiring a chainsaw from Saws are Us is £10 plus a daily rate.

- (b) Work out the daily rate.

$$17.50 - 10 = 7.50$$

$$7.50 \div 6 = 1.25 \quad \text{£ } 1.25 \quad (1)$$

Salome wants to compare the cost of hiring a chainsaw from Saws are Us and from Saws to You.

Saws to You charge £3 for each day of hire.

Salome hires chainsaws for different periods of time. She wants to use the cheaper company.

- (c) Which of these two companies is the cheaper to hire the chainsaw from? You must show your working and explain your answer.

$$3n = \text{cost for } n \text{ days}$$

$$10 \text{ days } 3 \times 10 = £30 \quad \text{Saws to you}$$

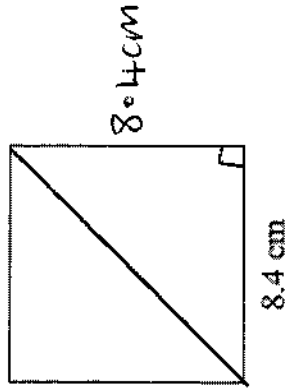
$$10 \times 1.25 + 10 = \text{Saws are us}$$

$$£22.50$$

It is cheaper to hire from Saws to you (Total 5 marks) (3)

if you are hiring for less than 6 days.

A square has sides of length 8.4 cm.



Work out the length of a diagonal of the square. Give your answer correct to 3 significant figures.

Use Pythag Th

$$c^2 = a^2 + b^2$$

$$c^2 = 8.4^2 + 8.4^2$$

$$c^2 = 141.12$$

$$c = \sqrt{141.12}$$

$$c = 11.87939392$$

$$c = 11.9 \text{ to 3sf}$$

The diagram shows a circular pond with a path around it.

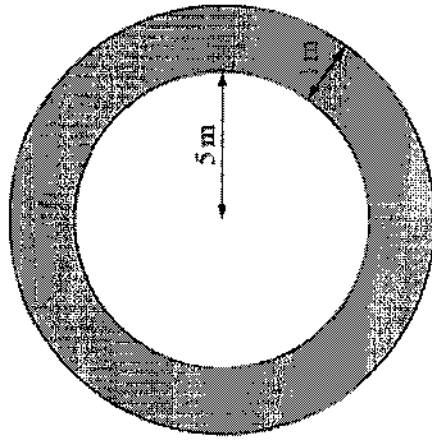


Diagram NOT
accurately drawn

The pond has a radius of 5m.
The path has a width of 1m.

Work out the area of the path.
Give your answer correct to 3 significant figures.

Area of path = Area of outer circle - Area of inner circle

$$\text{outer circle - radius} = 5\text{m} + 1\text{m} = 6\text{m}$$

$$\text{Area} = \pi \times 6^2$$

$$\text{Area} = 36\pi$$

$$\text{Inner circle (pond) Area} = \pi \times 5^2$$

$$\text{Area} = 25\pi$$

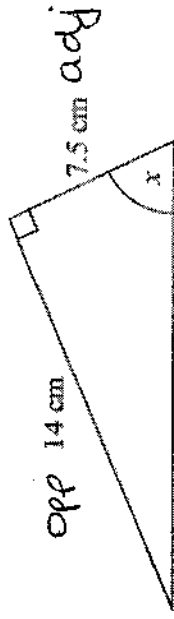
$$\text{Area of Path} = 36\pi - 25\pi = 11\pi$$

$$11\pi = 34.5575 \dots$$

$$= \underline{\underline{34.6 \text{ to 3sf}}}$$

..... m²
(Total 3 marks)

Here is a right-angled triangle.



Work out the size of the angle marked x .
Give your answer to the nearest degree.

Use Trigonometry

$$\tan x = \frac{\text{opposite side}}{\text{adjacent side}}$$

$$\tan x = \frac{14}{7.5}$$

$$\text{Angle } x = \tan^{-1}\left(\frac{14}{7.5}\right)$$

$$= 61.82$$

$$= \underline{\underline{62^\circ \text{ to nearest degree}}}$$

.....
(Total 3 marks)

A box is on a table.

The area of the box in contact with the table is 1500 cm^2 .
The pressure on the table is 28 newtons/m^2 .

Work out the force exerted by the box on the table.
Give your answer correct to the nearest whole number.

$$A = 1500 \text{ cm}^2$$

$$p = 28 \text{ newtons/m}^2$$

* units different

$$\text{Convert } 1500 \text{ cm}^2 \text{ into m}^2$$

$$1500 \div (100 \times 100) = 0.15 \text{ m}^2$$

$$p = \frac{f}{A}$$

$$28 = \frac{f}{0.15}$$

$$f = 28 \times 0.15$$

$$f = 4.2$$

$$= \underline{4 \text{ newtons}} \text{ to nearest whole}$$

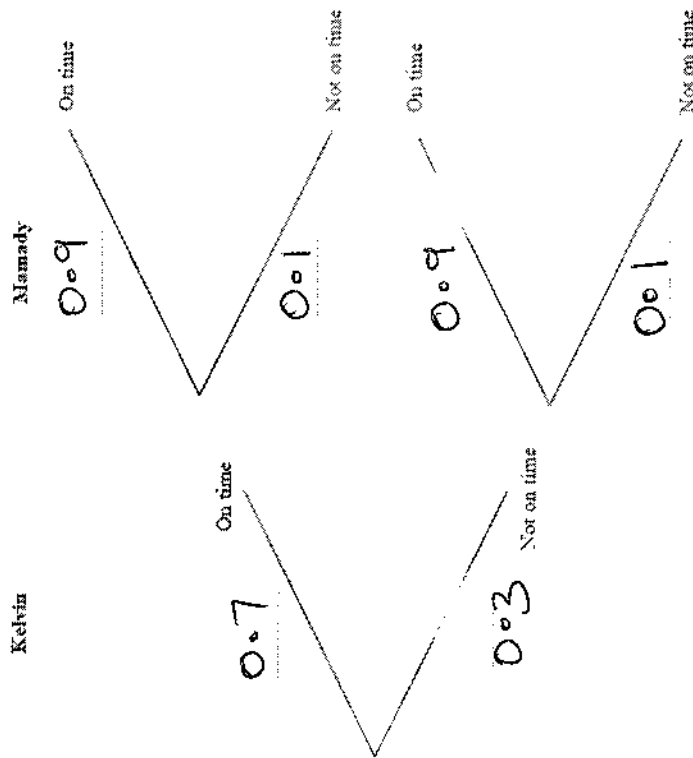
..... newtons
(Total 3 marks)

Kelvin and Mamady are in the same class.

The probability that Kelvin arrives on time is 0.7 .

The probability that Mamady arrives on time is 0.9 .

Complete the probability tree diagram.



(2)

(b) Work out the probability that Kelvin and Mamady both arrive on time.

$$0.7 \times 0.9 = 0.63$$

..... (2)
(Total 4 marks)

Lynn is planning a Christmas party for her badminton club.
Here are her costs.

Food	£176
Drink	£103
Hire of room	£36 per hour

Lynn wants to hire the room for 4 hours.

There will be 28 people at the party.

Lynn will charge these people £15 each.

Will Lynn get enough money to pay all her costs?

You must show your working.

$$\begin{array}{r}
 \text{Total outlay} = \text{£}176 \\
 \text{£}103 \\
 \text{£}1,444 \\
 \hline
 \text{£}4,223
 \end{array}$$

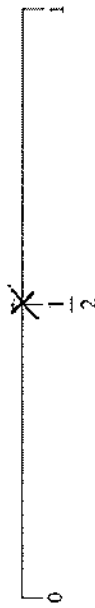
$$28 \times \text{£}15 = \text{£}420$$

Lynn will not get enough money to pay all her costs.

(Total 4 marks)

(a) Sabrina throws a fair coin.

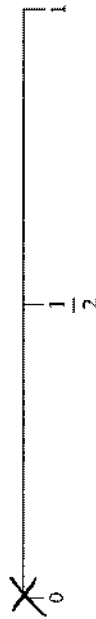
On the probability scale, mark with a cross (x) the probability that the coin will land on tails.



(1)

(b) Suresh throws an ordinary 6-sided dice.

On the probability scale, mark with a cross (x) the probability that he will throw a 7

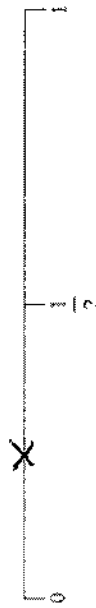


(1)

(c) There are three yellow sweets and one blue sweet in a bag.

Graham takes at random a sweet from the bag.

On the probability scale, mark with a cross (x) the probability that he will take a blue sweet.

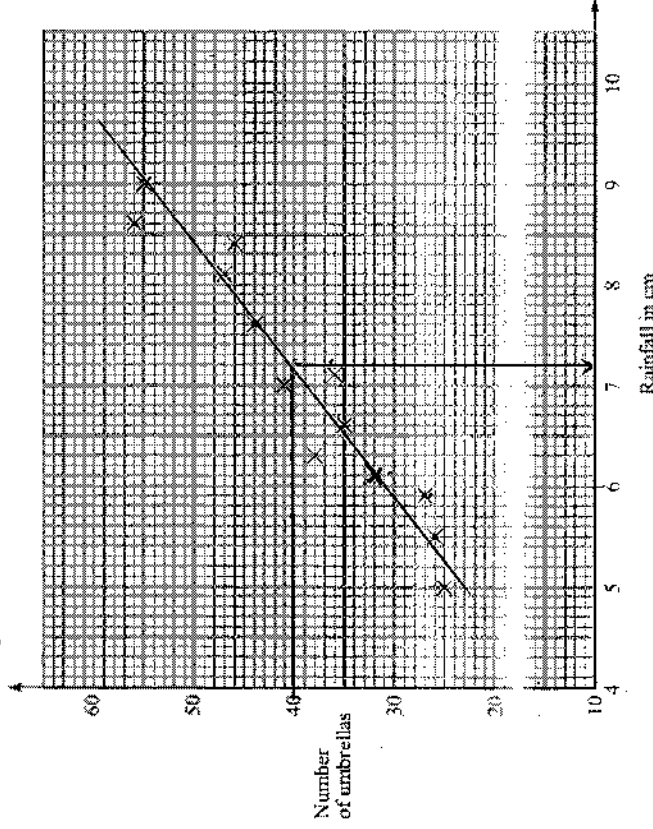


(1)

(Total 3 marks)

Mr Wither sells umbrellas.

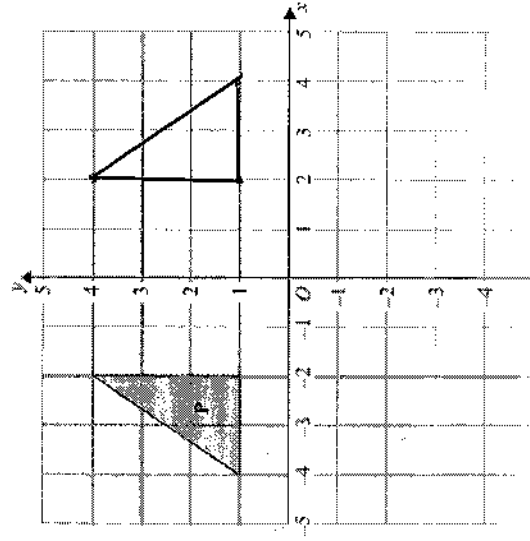
The scatter graph shows some information about the number of umbrellas he sold and the rainfall, in cm, each month last year.



In January of this year, the rainfall was 6.1 cm.
During January, Mr Wither sold 32 umbrellas.

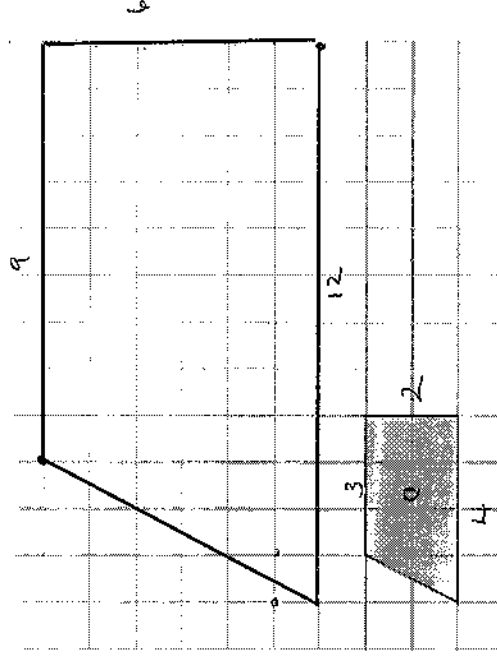
- Show this information on the scatter graph. (1)
- What type of correlation does this scatter graph show? (1)
positive
- In February of this year, Mr Wither sold 40 umbrellas.
(c) Estimate the rainfall for February. (2)
7.2 cm

(Total 4 marks)



(a) Reflect triangle P in the y-axis.

(2)



(b) Draw an enlargement of shape Q scale factor 3

(2)

(Total 4 marks)

113

A pile of sand has a weight of 65 kg.

Some of the sand is put into a small sack.

The rest of the sand is put into a large sack.

The sand in the large sack weighs 15 kg more than the sand in the small sack.

What is the weight of the sand in the small sack?

The weight of both sacks is 65 kg

Weight in large sack is ~~65~~ = 40 kg

Weight in small sack is 40 - 15 = 25 kg

..... kg

(Total 2 marks)

114

Laura is asked to solve the equation $6x + 4 = 10$

Here is her working.

$$\begin{array}{l} 6x + 3 = 9 \quad \checkmark \\ 6x = 12 \quad \times \\ x = 2 \end{array}$$

Laura's answer is wrong.
What mistake did she make?

She can subtract 1 from both sides
to give $6x + 3 = 9$

but then she must subtract 3 from
both sides to give

$$6x = 6$$

$$x = 1$$

(Total 1 mark)

In

August 2008, Eddie hired a car in Italy.
The cost of hiring the car was £620
The exchange rate was £1 = €1.25

- (a) Work out the cost of hiring the car in euros (€).

$$620 \times 1.25 = \underline{\text{€ } 775}$$

€ (2)

Eddie bought some perfume in Italy.

The cost of the perfume in Italy was €50
The cost of the same perfume in London was £42

The exchange rate was still £1 = €1.25

- (b) Work out the difference between the cost of the perfume in Italy and the cost of the perfume in London.

Give your answer in pounds (£).

(1) Convert €50 into £'s

$$\text{€ } 50 \div 1.25 = \text{£ } 40$$

The difference in cost is £42-£40

$$= \underline{\text{£ } 2}$$

£ (3)
(Total 5 marks)

An internet bookshop uses this advert.

Each day every 3rd customer gets a mystery prize.
Each day every 20th customer gets free postage and packaging.

On Tuesday the internet bookshop had 150 customers.

- (a) How many of the 150 customers got a mystery prize?

$$150 \div 3 = 50$$

..... (2)

- (b) How many of the 150 customers got free postage and packaging?

$$150 \div 20 = 7.5$$

7 (2)

- (c) How many of the 150 customers got both a mystery prize and free postage and packaging?

The 60th and 120th customer will get both

2 (2)
(Total 6 marks)

Mrs Phillips needs to decide when to have the school sports day.

The table shows the number of students who will be at the sports day on each of 4 days. It also shows the number of teachers who can help on each of the 4 days.

	Tuesday	Wednesday	Thursday	Friday
Number of students	179	162	170	143
Number of teachers	15	13	14	12

For every 12 students at the sports day there must be at least 1 teacher to help.

On which of these days will there be enough teachers to help at the sports day? You must show all your working.

12 students per teacher

Tuesday $15 \times 12 = 180$ ✓
 Wednesday $13 \times 12 = 156$ -X (162 pupils)
 Thursday $14 \times 12 = 168$ -X (170 pupils)
 Friday $12 \times 12 = 144$ ✓

On Tuesday and Friday -
 there will be enough teachers
 to help at the sports day

(Total for Question 24 is 3 marks)

(Total 3 marks)

30% of a number is 120
 Work out the number.

If 30% is 120
 then 10% is $\frac{120}{3} = 40$

so 100% is $40 \times 10 = 400$

or

$120 = 30\% = 0.3$ of original amount

$120 \div 0.3 = 400$

Show that $7\frac{1}{2} - 4\frac{2}{3} = 2\frac{5}{6}$

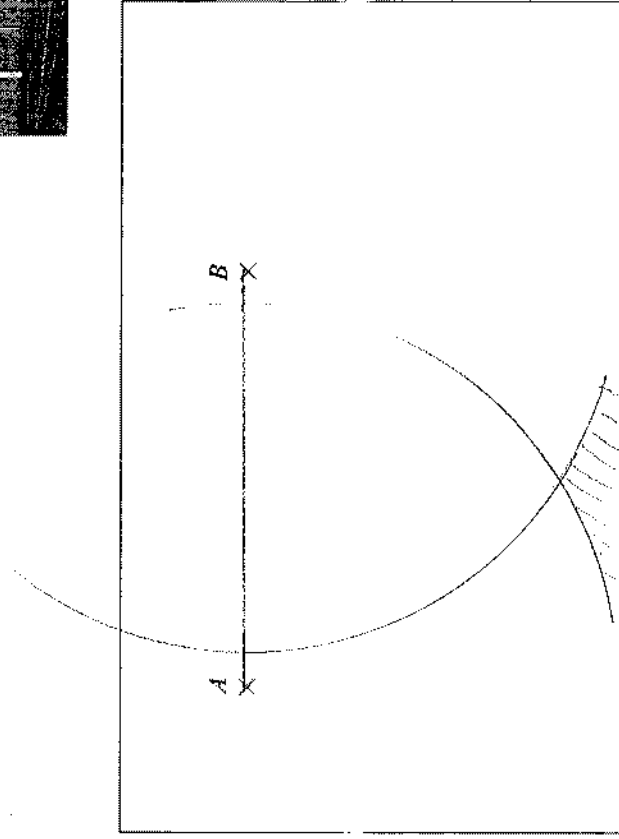
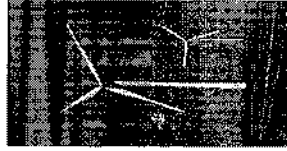
Convert to top heavy fractions
Then find common denominator to
create equivalent fractions

$$\begin{aligned}
 7\frac{1}{2} - 4\frac{2}{3} &= \frac{15 \times 3}{2} - \frac{14 \times 2}{3} \\
 &= \frac{45 - 28}{6} \\
 &= \frac{17}{6} \\
 &= 2\frac{5}{6}
 \end{aligned}$$

(Total 3 marks)

The diagram shows a map of a field.
The scale of the map is 1 cm represents 20 m.

Wind turbines



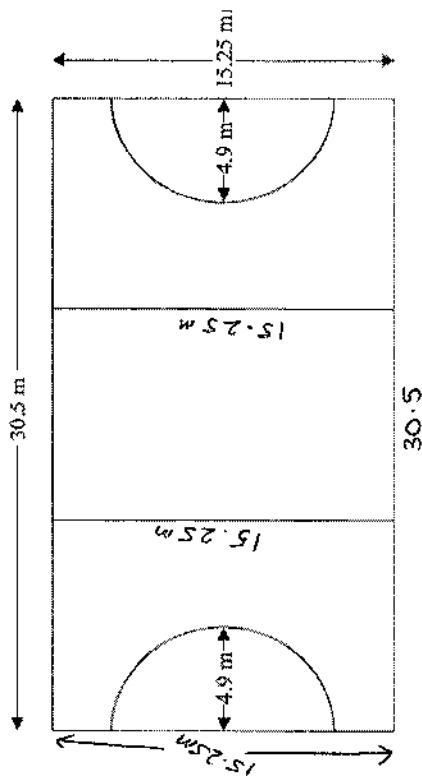
A and B are two wind turbines in the field.
A third wind turbine is to be put in this field.

There must be at least 100 m between wind turbines.

Show, by shading, where the third wind turbine can be put.

(Total 3 marks)

The diagram shows the lines of a netball court.



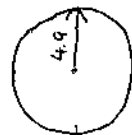
The court is made from three rectangles and two semi-circles.
All the corners are right angles.

Mr Handy is painting the lines for the netball court on the floor of a school sports hall.

Work out the total length of the lines of the netball court.
Give your answer correct to the nearest metre.

$$\text{Straight lines} = 30.5 + 30.5 + 15.25 + 15.25 + 15.25 + 15.25 \\ = 122\text{m}$$

$$\text{Circumference of a circle} = \pi \times \text{diameter} \\ (\text{or } 2\pi r)$$



$$\text{Radius} = 4.9\text{m so Diameter} = 9.8\text{m}$$

$$\text{Circumference} = \pi \times 9.8 = 30.79\text{m}$$

Two halves make a full circle

$$\text{so } 122\text{m} + 30.79\text{m} = 152.79 \dots 153 \dots \text{m} \\ (\text{Total 4 marks}) \\ = 153\text{m to nearest metre}$$

Bhavna is twice as old as Abbie.
The total of their ages is less than 30

What is Bhavna's greatest possible age?

Give your answer as a whole number of years.
You must show all your working.

$$\text{Abbie} = x$$

$$\text{Bhavna} = 2x$$

$$2x + x < 30$$

$$3x < 30$$

$$x < 10$$

$$\text{Abbie} \leq 10$$

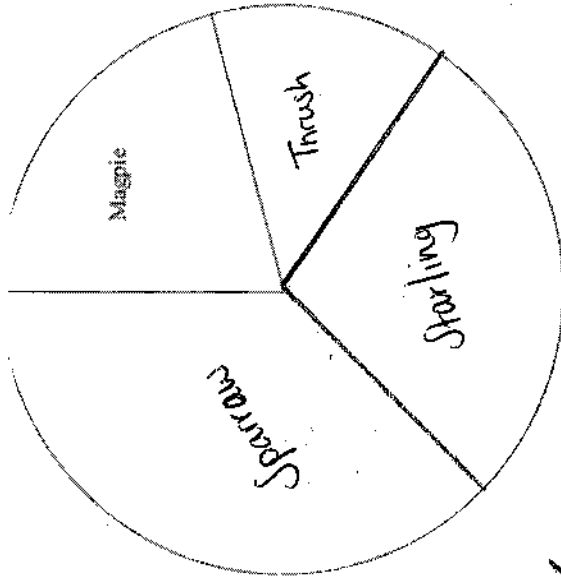
$$\text{Bhavna} \leq 20$$

123

The table gives some information about the birds Paula sees in her garden one day.

Bird	Frequency	Angle
Magpie	15	75
Thrush	10	50
Starling	20	100
Sparrow	27	135
Total	72	360

Complete the accurate pie chart.



(Total 3 marks)

124

There are only red pens and blue pens in a box. There are 12 red pens in the box.

The probability of taking at random a blue pen from the box is $\frac{2}{3}$

Work out the total number of pens in the box.

$$\frac{1}{3} \times 12 = \frac{12}{3} = 4$$

36 total pens in the box

36
(Total 3 marks)

Henry is thinking about having a water meter.

These are the two ways he can pay for the water he uses.

Water Meter
A charge of £28.20 per year
plus
91.22p for every cubic metre of water used
1 cubic metre = 1000 litres

No Water Meter
A charge of £107 per year

Henry uses an average of 180 litres of water each day.

Henry wants to pay as little as possible for the water he uses.
Should Henry have a water meter?

$$\begin{aligned}
 180 \times 365 &= 65700 \text{ litres of water per year} \\
 65700 \div 1000 &= 65.7 \text{ cubic metres of water per year} \\
 65.7 \times 91.22 &= 5993.154p \\
 5993.154 \div 100 &= £59.93 \\
 £59.93 + £28.20 &= £88.13
 \end{aligned}$$

Yes Henry should have a water meter. It will save him £18.87 per year.

(Total for Question 15 is 5 marks)

Here are the first four terms of an arithmetic sequence.

3 10 17 24

(a) Find, in terms of n , an expression for the n th term of this arithmetic sequence.

$$\begin{array}{ccccccc}
 3 & 10 & 17 & 24 & & & \\
 \nearrow +7 & \nearrow +7 & \nearrow +7 & & & & \\
 7 & 14 & 21 & 28 & & & \\
 & & 7n-4 & & & & 7n-4
 \end{array}$$

(b) Is 150 a term of this sequence?

You must explain how you get your answer.

$$150 = 7n + 4$$

$$146 = 7n$$

$$\frac{146}{7} = n \quad \text{Not a whole number}$$

therefore not in the sequence.

(Total 4 marks)

Each year Wenford Hospital records how long patients wait to be treated in the Accident and Emergency department.

In 2015 patients waited 11% less time than in 2014.

In 2015 the average time patients waited was 68 minutes.

- (a) Work out the average time patients waited in 2014.
Give your answer to the nearest minute.

$$\begin{aligned}
 & \swarrow 100\% - 11\% \\
 & \div 89 \quad 68 \text{ mins} = 89\% \\
 & \quad \quad 0.764 \text{ mins} = 1\% \\
 & \times 100 \quad 76.4 \text{ mins} = 100\% \times 100 \\
 & \quad \quad \rightarrow 76 \text{ to the nearest minute} \quad 76 \text{ minutes (3)}
 \end{aligned}$$

The hospital has a target to reduce the average time patients wait to be treated in the Accident and Emergency department to 60 minutes in 2016.

- (b) Work out the percentage decrease from 68 minutes to 60 minutes.

$$\begin{aligned}
 \frac{\text{difference}}{\text{original}} &= \frac{8}{68} = 0.11764... \\
 0.11764... \times 100 &= 11.76
 \end{aligned}$$

11.76% (2)

(Total 5 marks)

Each length of the side of square B is twice the length of the side of square A.

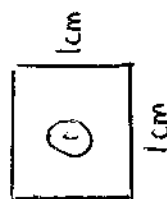
John says that this means the area of square B is twice the area of square A.

Is John right?

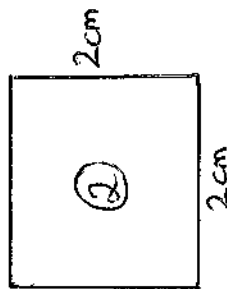
Justify your answer.

No. John is not right.

For example



$$\text{Area} = 1 \times 1 = 1 \text{ cm}^2$$



$$\text{Area} = 2 \times 2 = 4 \text{ cm}^2$$

Area of shape B is four times larger than shape A.

(Total 1 mark)

Solve $x^2 + 3x - 10 = 0$

Need 2 numbers that add to make 3
and multiply to make -10.

$$-2 \times 5 = -10$$

$$-2 + 5 = 3$$

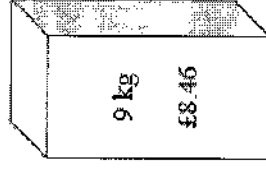
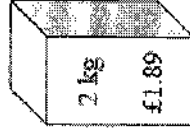
$$(x-2)(x+5) = 0$$

$$\underline{\underline{x=2 \quad x=-5}}$$

x =

(Total 2 marks)

Soap powder is sold in three sizes of box.



A 2 kg box of soap powder costs £1.89

A 5 kg box of soap powder costs £4.30

A 9 kg box of soap powder costs £8.46

Which size of box of soap powder is the best value for money?
You must show how you get your answer.

$$£1.89 \div 2 = £0.945 \text{ per kg}$$

$$£4.30 \div 5 = £0.86 \text{ per kg}$$

$$£8.46 \div 9 = £0.94 \text{ per kg}$$

The 5kg box is the best value as
it only costs 86p per kg.

(Total is 3 marks)

Gary drove from London to Sheffield.

It took him 3 hours at an average speed of 80 km/h.

Lyn drove from London to Sheffield.

She took 5 hours.

Assuming that Lyn

drove along the same roads as Gary
and did not take a break,

(a) work out Lyn's average speed from London to Sheffield.

$$\text{Speed} = \frac{\text{distance}}{\text{time}} \quad 300$$

$$80 = \frac{\text{distance}}{3} \quad \text{km}$$

$$240 = \text{distance} \quad 240 \text{ km}$$

$$\text{Speed} = \frac{240}{5} = 48 \text{ km/h}$$

$$48 \text{ km/h} \quad (3)$$

(b) If Lyn did not drive along the same roads as Gary, explain how this could affect your answer to part (a).

The distance would not be the same so it might affect her speed.

(1)

(Total is 4 marks)

The first three terms of a different Fibonacci sequence are

$$a, b, a+b, a+b+b, 2a+3b, 3a+5b$$

Given that the 3rd term is 7 and the 6th term is 29, find the value of a and the value of b .

$$\begin{array}{r} a+b=7 \\ 3a+5b=29 \\ \hline 3a+3b=21 \end{array}$$

$$\begin{array}{r} 2b=8 \\ b=4 \end{array}$$

$$\begin{array}{r} a+4=7 \\ a=3 \end{array} \quad (-4) \quad (-4)$$

$$\begin{array}{r} a=3 \\ b=4 \end{array}$$

(Total is 3 marks)

133

One uranium atom has a mass of 3.95×10^{-22} grams.

(a) Work out an estimate for the number of uranium atoms in 1 kg of uranium.

$$4 \times 10^{-22}$$

$$1000 \div (4 \times 10^{-22})$$

$$2.5 \times 10^{24}$$

(b) Is your answer to (a) an underestimate or an overestimate?
Give a reason for your answer.

Over estimate because 1 rounded up
from 3.95 to 4

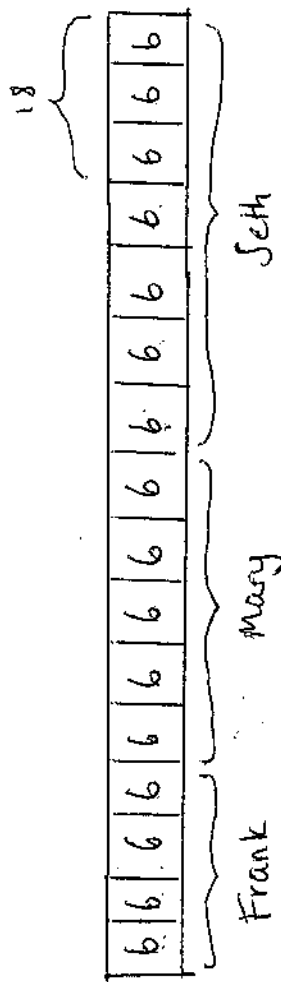
(1)

(Total is 4 marks)

134

Frank, Mary and Seth shared some sweets in the ratio 4 : 5 : 7
Seth got 18 more sweets than Frank.

Work out the total number of sweets they shared.



96

(Total is 3 marks)

135

There are 1200 students at a school.

Kate is helping to organise a party.
She is going to order a pizza.

Kate takes a sample of 60 of the students at the school.
She asks each student to tell her one type of pizza they want.

The table shows information about her results.

Pizza	Number of students
ham	20
salamì	15
vegetarian	8
margherita	17

60

Work out how much ham pizza Kate should order.

Write down any assumption you make **and** explain how this could affect your answer

$$\text{Ham} : \frac{20}{60} = \frac{2}{6} = \frac{1}{3}$$

$$\frac{1}{3} \text{ of } 1200 = 400$$

* Must people in the original sample said ham
however this may not be the case with the whole population

(Total is 3 marks)

136

£107

Henry is thinking of having a water meter.

These are the two ways he can pay for the water he uses.

Water Meter

A charge of £28.20 per year

plus

91.22p for every cubic metre of water used

1 cubic metre = 1000 litres

No Water Meter

A charge of £107 per year

$$1st \quad 180 \times 365 (1yr)$$

65700 litre

Henry uses an average of 180 litres of water each day.

Use this information to determine whether or not Henry should have a water meter.

$$\text{Water Meter} : (91.22 \times 65.7) +$$

2820

(change to ?)

65.7 Cubic metres

$$= 8813.154 \text{ p}$$

$$\downarrow \div 100 (\text{£})$$

$$\text{£ } 88.13 \text{ (2dp; money)}$$

* Water Meter

(Total is 5 marks)

137

There are 25 boys and 32 girls in a club.

$\frac{2}{5}$ of the boys and $\frac{1}{2}$ of the girls walk to the club.

The club leader picks at random a child from the children who walk to the club.

Work out the probability that this child is a boy.

$$25 + 32 = 57$$

$$\frac{2}{5} \text{ of } 25 = 10 \text{ boys walk}$$

$$\frac{1}{2} \text{ of } 32 = 16 \text{ Girls walk}$$

$$P(\text{Boy who walks}) = \frac{\text{Boys who walk}}{\text{Children who walk}}$$

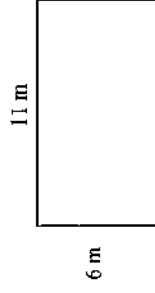
$$= \frac{10}{26}$$

(Total is 3 marks)

138

A tin of varnish costs £15

A rectangular floor has dimensions 6 m by 11 m.
The floor is going to be covered in varnish.



Heleen assumes that each tin of this varnish covers an area of 12 m^2 .

(a) Using Heleen's assumption, work out the cost of buying the varnish for this floor.

$$\begin{aligned} \text{Area of floor} &= 6 \times 11 \\ &= 66 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Amount of varnish} &= 66 \div 12 \\ &= 5.5 \text{ tins} \\ &\text{(6 tins needed)} \end{aligned}$$

$$\text{Cost} = 6 \times 15 = \text{£}90$$

£90

Heleen finds that each tin of varnish covers less than 12 m^2 .

(b) Explain how this might affect the number of tins she needs to buy.

She might need to buy more tins to cover the floor.

(Total is 5 marks)

139

Mr Jones gave four of his students a test.
The total number of marks for the test is 80

Jamie got $\frac{1}{2}$ of the marks.

Andy got $\frac{2}{5}$ of the marks.

Robbie got $\frac{3}{4}$ of the marks.

Davy got $\frac{3}{5}$ of the marks.

Write the fractions in order of size.
Start with the smallest fraction.

$$\frac{1}{2} \quad \frac{2}{5} \quad \frac{3}{4} \quad \frac{3}{5}$$

~~24~~

$$\frac{10}{20} \quad \frac{8}{20} \quad \frac{15}{20} \quad \frac{12}{20}$$

$$\frac{2}{5} \quad \frac{1}{2} \quad \frac{3}{5} \quad \frac{3}{4}$$

(Total 3 mark)

140

Graham has £10
He wants to buy as many pencils as he can.
Each pencil costs 80 pence.

How many pencils can Graham buy?

$$£10 = 1000p$$

$$80 \overline{) 1000} \begin{array}{r} 12 \\ 160 \\ 20 \end{array}$$

15

(Total 3 mark)

141

3. (a) Simplify $m + m + m + m$

~~4m~~ (1)

(b) Simplify $5a - 2a$

~~3a~~ (1)

(c) Simplify $x \times y \times 4$

~~4xy~~ (1)

(Total 3 mark)

142

a) Write the number 4117 in words.

~~Four Thousand, ONE Hundred two SEVENTEEN.~~

(1)

(b) Write the number 4117 to the nearest hundred.

~~TH [H] T U~~ (1)

~~4 1 1 7~~

~~4 1 0 0~~

(Total 2 mark)

143

David takes, at random, a number from Box A.
He then takes, at random, a letter from Box B.

Box A

1	2
	6

Box B

A	C	E
---	---	---

(a) List all the possible outcomes he could get.

1A 1C 1E

2A 2C 2E

6A 6C 6E

(2)

(b) Find the probability that David takes the number 2 and the letter E.

9 outcomes

$$\frac{1}{9}$$

(2)

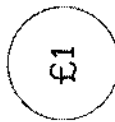
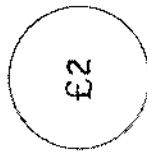
(Total 4 marks)

144

An ice cream van has this price list.

Price List	
Choc Ice	£1.25
Tub	£1.15
Cone	85p

Mitch only has these three coins.
He has no other money.



$$= £4$$

Mitch wants to buy a choc ice, a tub and 2 cones.

Has Mitch got enough money?
You must show your working.

choc 1.25

Tub 1.15

2 cones + 1.70

$$£ 4.10$$

No

10p
Needed.

(Total 3 marks)

145

Jack and Max share some counters.

Jack has 3 times as many counters as Max.

(a) Write down the ratio of the number of counters Jack has to the number of counters Max has.

3 : 1

(4 parts)

(b) What fraction of the counters does Max have?

$\frac{1}{4}$

Sunil has 40 counters.

9 of Sunil's counters are red.

(c) What fraction of Sunil's counters are not red?

$40 - 9 = 31$ (not red)

$\frac{31}{40}$

(1)

(Total 3 marks)

146

Which is bigger $\frac{2}{5}$ or 0.6?

Justify your answer.

$$\frac{2}{5} \begin{matrix} \textcircled{\times 2} \\ \textcircled{\times 2} \end{matrix} = \frac{4}{10} = \frac{40}{100} = 40\%$$

$$0.6 = \frac{6}{10} = \frac{60}{100} = 60\%$$

$\therefore 0.6$ is bigger

(Total 3 marks)

147

A bag contains only red counters and blue counters. There are 4 red counters in the bag.

The probability of taking a blue counter is the same as the probability of taking a red counter.

(a) How many blue counters are there in the bag?

4 blues

(1)

In another bag there are 14 counters.

The bag contains only red counters, blue counters and yellow counters. 4 of the counters are red.

The probability of taking a blue counter is twice the probability of taking a red counter.

(b) How many yellow counters are there in the bag?

R : B : Y

2x : 2x : ?

2

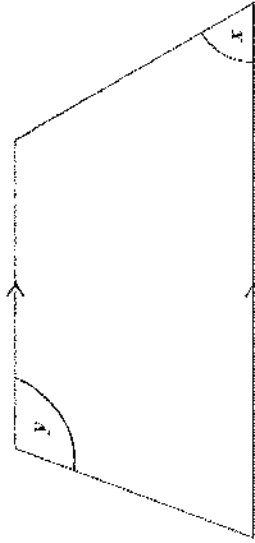
4 : 8

✓
12

14 - 12 = 2

(Total 4 marks)

148



(a) Write down the special name for this quadrilateral.

Trapezium

(1)

(b) Measure the size of the angle marked x.

60°

(1)

(c) Write down the special name for the angle marked y.

obtuse

(1)

(Total 3 marks)

Here is part of a bus timetable from Harrow Lane to Cartbridge Street.
Harrow Lane to Cartbridge Street

Harrow Lane	08 02	09 04	10 12	11 02	12 04	12 12
Elm Drive	08 19	09 21	10 29	11 19	12 21	12 29
Hamden Road	08 32	09 34	10 42	11 32	12 34	12 42
Swipe Crescent	08 41	09 43	10 51	11 41	12 43	12 51
Cartbridge Street	08 50	09 52	11 01	11 50	12 52	13 01

A bus goes from Harrow Lane to Cartbridge Street.
The bus leaves Harrow Lane at 08 02

(a) At what time should the bus get to Cartbridge Street?

08:50 (1)

Here is part of a bus timetable from Cartbridge Street to Harrow Lane.
Cartbridge Street to Harrow Lane

Cartbridge Street	13 11	14 14	15 07	16 11	17 14	18 07
Swipe Crescent	13 20	14 24	15 16	16 20	17 24	18 16
Hamden Road	13 29	14 33	15 25	16 29	17 33	18 25
Elm Drive	13 43	14 47	15 39	16 43	17 47	18 39
Harrow Lane	13 55	14 57	15 49	16 53	17 57	18 49

A bus goes from Cartbridge Street to Harrow Lane.
This bus leaves Hamden Road at 13 20

(b) Work out how many minutes this bus should take to go from Hamden Road to Elm Drive.

13:20 $\Rightarrow$ 13:43 14 mins (1)

Peter lives in Harrow Lane.

His grandmother lives in Swipe Crescent.

Peter visits his grandmother.

He goes by bus from Harrow Lane to Swipe Crescent.

Peter wants to have at least 3 hours with his grandmother.

He needs to be back at Harrow Lane by 16 00

(c) Plan Peter's journey to visit his grandmother and get back to Harrow Lane.
You must include the times of the buses.

HARROW 9:04 $\Rightarrow$ SWIPE 9:43
LANE CRESENT

Stays 3 hours

SWIPE 13:20 $\Rightarrow$ HARROW 13:53 (4)
CRESENT LANE (Total 6 marks)

[There are more times; this is just one solution]

On Monday Ravi drives for 4 hours.
His average speed is 30 mph.

(a) How far does Ravi drive on Monday?

Distance = Speed $\times$ Time
D = 30 $\times$ 4
D = 120

..... miles (2)

On Tuesday Ravi drives 200 km.

5 miles = 8 kilometres.

(b) On which day did Ravi drive further?

5 miles = 8 Km. $\times 25$
125 = 200 km
 $\therefore$ Tues 125 miles

(3)
(Total 5 marks)

151

Here are some patterns made from sticks.



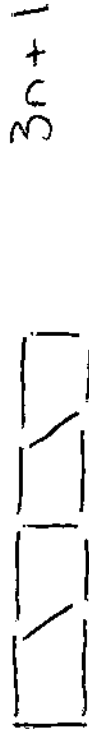
Pattern number 1

Pattern number 2

Pattern number 3

(a) Draw Pattern number 4

n^{th} term ;



$3n+1$

(b) Complete the table

Pattern number	Number of sticks
1	4
2	7
3	10
4	13
10	31
25	76

$$76 - 1 = 75$$

$$75 \div 3 = 25$$

(c) Find an expression, in terms of n , for the number of sticks needed for Pattern number n .

$$3n+1$$

(2)

(Total 6 marks)

152

Buses to Acton leave a bus station every 24 minutes.

Buses to Barton leave the same bus station every 20 minutes.

A bus to Acton and a bus to Barton both leave the bus station at 9 00 am.

When will a bus to Acton and a bus to Barton next leave the bus station at the same time?

LCM ; Lowest Common Multiple

24	48	72	96	120	144	...
20	40	60	80	100	120	...

$$120 \text{ mins} = 2 \text{ hours}$$

$$9 \text{ am} + 2 \text{ hour}$$

11 am.

(Total 3 marks)

153

(a) Expand and simplify $2(x+3y)+4(x-y)$

$$2x + 6y + 4x - 4y$$

Now collect

$$6x + 2y$$

(b) Factorise completely $8p - 12pq$

Take out Highest
Common factor
from both terms

$$4p(2 - 3q)$$

* Expand to check
answer

(Total 4 marks)

154

(a) Find the Highest Common Factor (HCF) of 30 and 42.

$$30$$

$$42$$

$$1 \ 2 \ 5 \ 6 \ 15 \ 30 \quad 1 \ 2 \ 3 \ 6 \ 7 \ 14 \ 21 \ 42$$

$$6$$

(b) Find the Lowest Common Multiple (LCM) of 30 and 45.

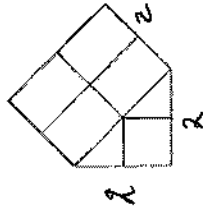
$$30 \ 60 \ 90 \ 120 \ 150 \ 180 \dots$$

$$45 \ 90 \ 135 \dots$$

$$90$$

(2)
(Total 4 marks)

Here is a prism.
It is made by cutting a solid cube of side 2 cm in half.



$$\text{Area} = \frac{b \times h}{2} = \frac{2 \times 2}{2} = 2 \text{ cm}^2$$

Find the volume of the prism.

$$V = \text{Area of cross section} \times \text{height (length)}$$

$$V = 2 \times 2 \quad \text{always} \\ V = 4 \text{ cm}^3 \quad \swarrow \text{cubic units}$$

(Total 3 marks)

Here are the ingredients needed to make 8 shortbread biscuits.

1 biscuit

Shortbread biscuits
makes 8 biscuits
120 g butter
60 g caster sugar
180 g flour

15g
70.5g
220.5g

Tariq is going to make some shortbread biscuits.
He has the following ingredients

330 g butter 200 g caster sugar 450 g flour

Work out the greatest number of shortbread biscuits that Tariq can make with his ingredients.
You must show all your working.

$$330 \text{ g butter} \quad \therefore 2 \times 120 = 240 \text{ g} \\ (2 \times 8) = 16 \quad (90 \text{ g over})$$

$$200 \text{ g Sugar} \quad \therefore 3 \times 60 = 180 \text{ g} \\ (3 \times 8) = 24 \quad (20 \text{ g over})$$

$$450 \text{ g flour} \quad \therefore 2 \times 180 = 360 \text{ g} \\ (2 \times 8) = 24 \quad (90 \text{ g over})$$

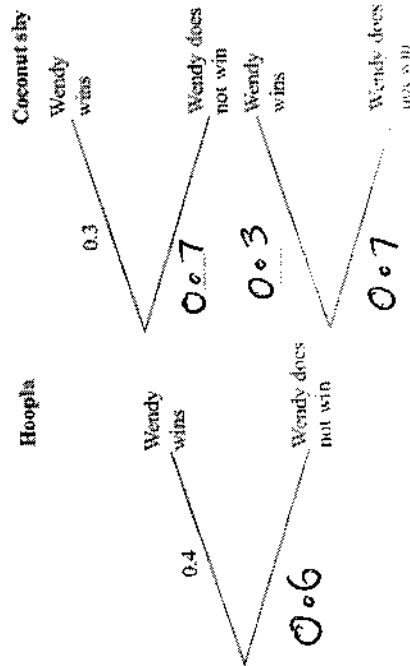
$\therefore$ only 16 from 20 biscuits
(Total 3 marks)

ingredients for 8
* Extra 2 biscuits from over

Wendy goes to a fun fair.
She has one go at Hoopla.
She has one go on the Coconut shy.

The probability that she wins at Hoopla is 0.4
The probability that she wins on the Coconut shy is 0.3

(a) Complete the probability tree diagram.



(Each branch must equal one)

(b) Work out the probability that Wendy wins at Hoopla and also wins on the Coconut shy.

WIN AND WIN

↑
Multiply

$$0.4 \times 0.3 = 0.12$$

$$\frac{4}{10} \times \frac{3}{10} = \frac{12}{100} \rightarrow \text{gain}$$

(2)
(Total 4 marks)

Railtickets and Cheaptrains are two websites selling train tickets.

Each of the websites adds a credit card charge and a booking fee to the ticket price.

Railtickets
Credit card charge: 2.25% of ticket price
Booking fee: 80 pence

Cheaptrains
Credit card charge: 1.5% of ticket price
Booking fee: £1.90

Nadia wants to buy a train ticket.
The ticket price is £60 on each website.
Nadia will pay by credit card.

Will it be cheaper for Nadia to buy the train ticket from Railtickets or from Cheaptrains?

$$2.25\% = 2\frac{1}{4}\%$$

£60 quantity

$$\therefore 1\% \text{ of } £60 = 60p \quad \therefore \frac{1}{4}\% = 15p$$

cheaptrains

$$1\% = 60$$

$$1\% = 60$$

$$\frac{1}{4}\% = 15$$

$$\text{Booking Fee} = \frac{80}{215}$$

$$1.5\% = 1\frac{1}{2}\%$$

$$1\% = 60$$

$$\frac{1}{2}\% = \frac{30}{90p}$$

plus booking £1.90

$$£2.15$$

Extra

(Total 4 marks)

$$\therefore £2.80$$

Railtickets

Answer is Railtickets

159

(a) Write 0.00385 in standard form.

$$3.85 \times 10^{-3}$$

Number is less than one
so power is negative

(b) Write 7.291×10^3 as an ordinary number.

729100

(c) Work out $(2.4 \times 10^{10}) \div (6 \times 10^{-2})$
Give your answer in standard form.

15%

$$\frac{2.4}{6} = \frac{0.4}{2 \times 10^{-2}}$$

Bus stop method

$$0.4 \times 10^{10} \times 10^{-2} = 4 \times 10^7$$

$$4 \times 10^{-1} \times 10^{10} \times 10^{-2}$$

Rules of indices
Add powers

(Total 4 marks)

160

5 pencils cost £1.85

Work out the cost of 9 of these pencils

$$£1.85 = 185p$$

Find the cost
of 1 pencil

$$\begin{array}{r} 37 \\ 5 \overline{) 185} \\ \underline{15} \\ 35 \\ \underline{35} \\ 0 \end{array} \therefore 37p$$

$$37 \times 9$$

$$\begin{array}{r} 37 \\ \times 9 \\ \hline 333 \end{array}$$

333 p or £3.33

(Total 2 marks)

These two triangles are congruent.

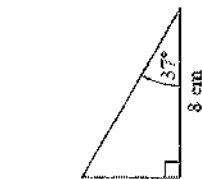


Diagram NOT accurately drawn

(a) Write down the size of the angle marked x .

Congruent has the same angles

These two quadrilaterals are congruent.

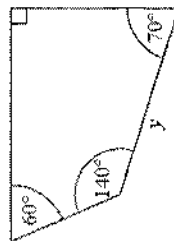
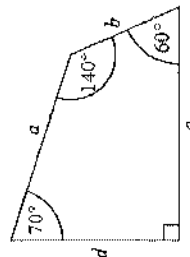


Diagram NOT accurately drawn



Side y is equal to one of the sides, a or b or c or d .

(b) Which side?

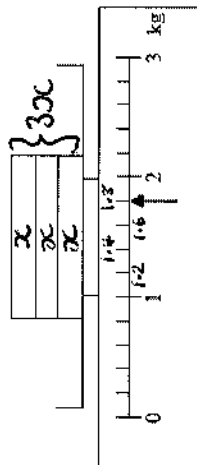
$$y = a$$

$$y = a$$

(1)

(Total 2 mark)

The scale shows the total weight of 3 boxes.



Each box is the same weight.

Work out the weight of one box.

$$3x = 1.8$$

$$x = \frac{1.8}{3}$$

if you do the same to the top and bottom, the fraction does not change.

$$x = \frac{1.8}{3} = \frac{18}{30} = \frac{3}{5}$$

$$\frac{3}{5} \text{ kg}$$

(Total 3 mark)

The table shows midday temperatures in four cities on one day in winter.

City	Midday temperature (°C)
Paris	2
Cardiff	-5
London	-3
Edinburgh	-1

(a) Which city had the lowest midday temperature?

Cardiff (1)

By midnight, the temperature in London had fallen by 5°C.

(b) Work out the midnight temperature in London.

London Midday = -3
Midnight = -3 - 5

-8 °C (2)

(Total 3 marks)

Here is a café menu.

Menu	
Cup of tea	75p
Cup of coffee	95p
Can of cola	80p
Beefburger	£1.65
Hot dog	£1.40

Kerry buys one beefburger and one can of cola.

(a) Work out the total cost.

1 beefburger 1.65
1 can of cola + 0.80
2.45 (2)

Tyler wants to buy 2 hot dogs, a cup of tea and a can of cola. He has a £5 note.

(b) Does Tyler have enough money? Give reasons for your answer.

2 hot dogs 2 x 1.40 = 2.80
Cup of tea 0.75
Can of Cola 0.80
4.35

Tyler has enough money, he only needs £4.35 (3)
(Total 5 marks)

(a) Work out the number which is exactly halfway between 1.2 and 1.4

$$\frac{1.2 + 1.4}{2} = \frac{2.6}{2} = 1.3$$

1.3 (1)

(b) Change 0.4 kilograms to grams.

$$1000 \text{ g} = 1 \text{ Kilograms}$$

$$0.4 \times 1000 = 400 \text{ g}$$

400 grams (1)

(c) Change 90 km/h into metres/second.

$$1 \text{ km} = 1000 \text{ m} \quad 1 \text{ h} = 60 \text{ sec}$$

$$\frac{90 \text{ km}}{\text{h}} = \frac{90 \times 1000}{60} = \frac{90000 \text{ m}}{60 \text{ sec}}$$

$\frac{01500}{60} \frac{000}{000}$ 1500 metres/second (2)
(Total 4 marks)

Here is a list of numbers.

4 8 5 9 10 5 6 3 4

(a) Work out the median. Put into order first

3, 4, 4, 5, 5, 6, 8, 9, 10

median is the middle value 5 (2)

(b) Work out the mean.

Add all numbers together, then divide by how many numbers there are.

$$3 + 4 + 4 + 5 + 5 + 6 + 8 + 9 + 10 = 54$$

$$\frac{54}{9} = 6$$

6 (2)
(Total 4 marks)

167

There are 120 cars in a car park.

Colour of car	Frequency
Red	40
Silver	24
Blue	19
Other	37

$$40 \times 3 = 120^\circ$$

$$24 \times 3 = 72^\circ$$

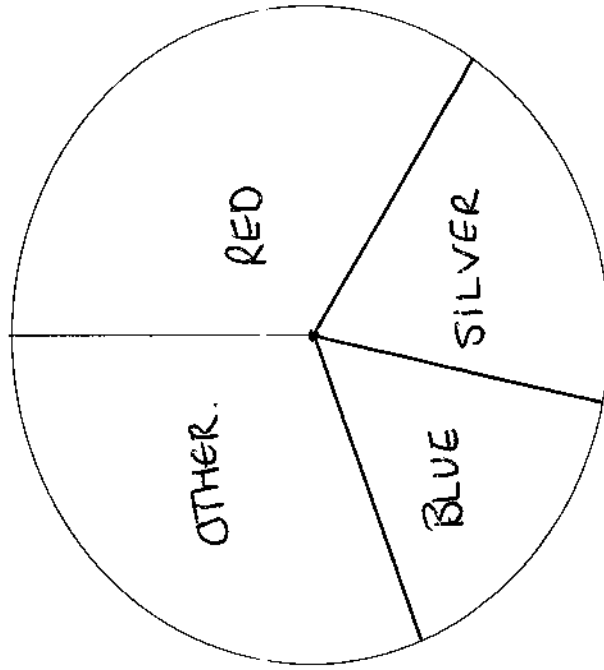
$$19 \times 3 = 57^\circ$$

$$37 \times 3 = 111^\circ$$

$$\underline{360^\circ}$$

Draw an accurate pie chart for this information.

Angles in pie chart = 360



(Total 3 marks)

168

The cost of 1.5 kg of peaches is £0.84

The total cost of 3 kg of peaches and 2 kg of apples is £2.34

Work out the cost of 1 kg of apples.

$$\text{Let } 1.5 \text{ kg of peaches is } £0.84 \rightarrow 1.5p = 0.84$$

$$\text{Let } 3 \text{ kg of peaches} + 2 \text{ kg of apples is } £2.34$$

$$\rightarrow 3p + 2a = 2.34$$

$$\text{If } 1.5p = 0.84$$

$$\text{then } 3p = 1.68 \quad (\text{put into 2nd equation})$$

$$1.68 + 2a = 2.34$$

$$2a = 2.34 - 1.68$$

$$2a = 0.66$$

$$a = \frac{0.66}{2}$$

$$a = \underline{\underline{£0.33}}$$

(Total 3 marks)

Here is a rule for working out the volume of a pyramid.

Multiply the base area by the height and
then divide by 3

A pyramid has a base area of 9 cm² and a height of 4 cm.

(a) Use the rule to work out the volume of this pyramid.

$$\frac{\text{base area} \times \text{height}}{3} = \frac{9 \times 4}{3} = \frac{36}{3}$$

$$\frac{12}{\dots\dots\dots \text{cm}^3} \quad (2)$$

A different pyramid has a volume of 20 cm³
The base area of this pyramid is 10 cm².

(b) Work out the height of this pyramid.

$$\frac{\text{Base area} \times \text{height}}{3} = \text{Volume}$$

$$\frac{10 \times h}{3} = 20$$

$$10 \times h = 60$$

$$h = \frac{60}{10}$$

$$h = 6$$

$$\frac{6}{\dots\dots\dots \text{cm}} \quad (3)$$

(Total 5 marks)

Brian wants to go on holiday.
He is going to take out a loan of £500 to help pay for the holiday.

Brian will have to pay back the £500 plus 20% interest over 12 months. He will pay back the same amount of money each month.

How much money will he pay back each month?

$$20\% \text{ of } £500$$

$$\begin{aligned} 10\% &= 500 \div 10 = 50 \\ 20\% &= 50 \times 2 = £100 \end{aligned}$$

$$\begin{aligned} £500 + 20\% \text{ interest} &= £500 + £100 \\ &= £600 \end{aligned}$$

$$\frac{600}{12} = \underline{\underline{£50}} \text{ pay back each month}$$

$$(60 \div 12 = 5)$$

$$£ \underline{\underline{50}} \quad (\text{Total 4 marks})$$

13. (a) Work out $\frac{5}{9}$ of 72 kg.

$$72 \div 9 = 8$$

$$8 \times 5 = 40$$

$$\underline{40} \text{ kg}$$

(2)

- (b) Show that $\frac{1}{3} + \frac{4}{15} = \frac{3}{5}$

$$\frac{1}{3} + \frac{4}{15}$$

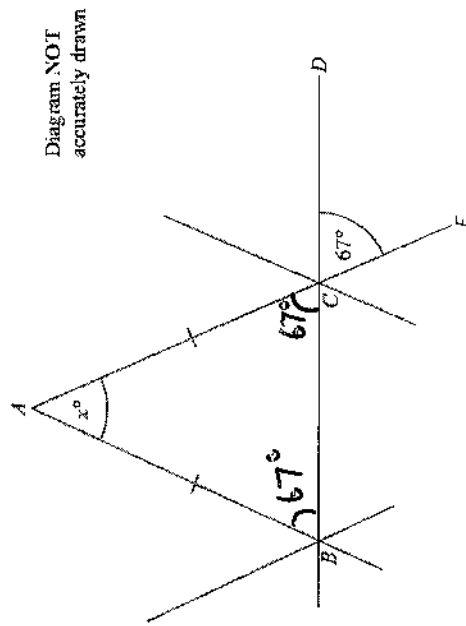
(x3)

$$\frac{5}{15} + \frac{4}{15} = \frac{9}{15} \text{ (simplify)} = \frac{3}{5}$$

$\xrightarrow{\div 3}$

(2)
(Total 4 marks)

The diagram shows part of the design of a stained glass window.



ABC is an isosceles triangle. BCD and ACE are straight lines. Angle DCE = 67° .

Work out the size of the angle marked x . ~~Give reasons for your answer~~

Give reasons for your answer

Angle $BCA = 67^\circ$ – opposite angle to $DCE (67^\circ)$

Triangle ABC = isosceles triangle

So $ABC = BCA = 67^\circ$

Angles in triangle = 180

So $67 + 67 + x = 180$

$$134 + x = 180$$

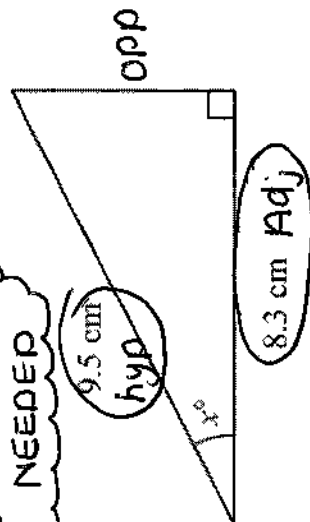
$$x = 180 - 134$$

$$x = \underline{\underline{46^\circ}}$$

(Total 4 marks)

**CALCULATOR
NEEDED**

Diagram NOT
accurately drawn



Work out the value of x .
Give your answer correct to 1 decimal place.

SOL

$$\cos x^\circ = \frac{8.3}{9.5}$$

TO

$$x = \cos^{-1}\left(\frac{8.3}{9.5}\right)$$

$$x = 29.11036718$$

$$x = 29.1^\circ$$

$x = \dots\dots\dots$
(Total 3 marks)

Nails of length 35 millimetres are sold in three sizes of packets.

There are 20 nails in a small packet, costing £1.36

There are 50 nails in a medium packet, costing £3.30

There are 90 nails in a large packet, costing £6.03

Small
£1.36
20 nails

Medium
£3.30
50 nails

Large
£6.03
90 nails

(a) Which size of packet is the best value for money?
You must show clearly how you got your answer.

$$\textcircled{S} 20 \text{ nails} = £1.36$$

$$\div 20 \text{ nails} = £0.68$$

$$\textcircled{M} 50 \text{ nails} = £3.30$$

$$\div 50 \text{ nails} = £0.66$$

$$\textcircled{L} 90 \text{ nails} = £6.03$$

$$\div 90 \text{ nails} = £0.67$$

The best value is
the cheapest.

Best value = Medium
pack.

(4)

Nails of different lengths are sold in mixed packets.

Here are the lengths, in millimetres, of the nails in a mixed packet.

20	35	49	30	45
40	50	25	39	30
30	37	47	55	28

(b) Draw an ordered stem and leaf diagram for this information.

Smallest = 20 largest = 55

REMEMBER THE KEY

Rough

2	0	5	8
3	0	0	5
4	0	5	7
5	0	5	

Ordered

2	0	5	8
3	0	0	5
4	0	5	7
5	0	5	

(c) Find the median length.

$$\text{key} \Rightarrow 20 = 20$$

$$\left(\frac{15+1}{2} = 8^{\text{th}} \text{ number along} \right)$$

37

mm (1)
(Total 8 marks)

175

- (a) Expand and simplify
- $(x+9)(x-3)$

method ①

$$(x+9)(x-3)$$

$$x^2 + 9x - 3x - 27$$

$$x^2 + 6x - 27$$

method ②

x	x^2	$+9x$
-3	$-3x$	-27

$$x^2 + 9x - 3x - 27$$

$$x^2 + 6x - 27$$

(2)

- (b) Make
- a
- the subject of the formula
- $v = u + at$

$$v = u + at$$

$$v - u = at$$

$$\frac{v - u}{t} = a$$

$$a = \frac{v - u}{t}$$

(2)

(Total 4 marks)

176

Suha Industries make drink containers.

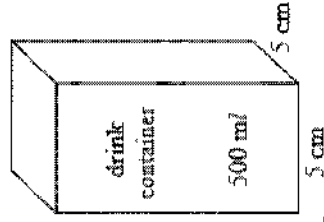
They need to design a new container for 500 ml of drink.

The container has to be in the shape of a cuboid.

The base of the cuboid will be a square.

The square has sides of length 5 cm.

Work out the minimum height of the container.

Diagram NOT
accurately drawn

$$1 \text{ ml} = 1 \text{ cm}^3$$

$$500 \text{ ml} = 500 \text{ cm}^3$$

$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$

$$500 = 5 \times 5 \times h$$

$$500 = 25h$$

$$\frac{500}{25} = h$$

$$h = 20 \text{ cm}$$

20

cm

(Total 3 marks)

**CALCULATOR
NEEDED**

177

On July 1st 2004, Jack invested £2000 at 5% per annum compound interest.
Work out the value of Jack's investment on July 1st 2006

2004 to 2006 is 2 years.

Method 1

Year 1 5% of £2000 = 100 2000 + 100 = 2100
Year 2 5% of £2100 = 105 2100 + 105 = £2205

OR

Method 2

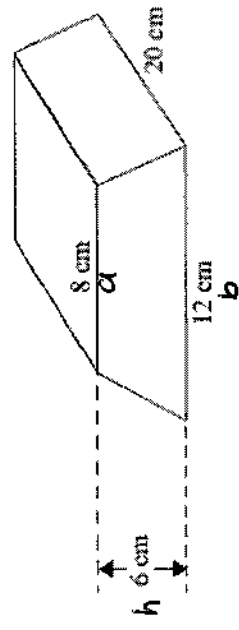
original amount percentage multiplier number of years
 $2000 \times 1.05^2 = \underline{\underline{£2205}}$

£ 2205

(Total 3 marks)

178

Diagram NOT
accurately drawn



The diagram shows a solid prism made from metal.
The cross-section of the prism is a trapezium.

The parallel sides of the trapezium are 8 cm and 12 cm.
The height of the trapezium is 6 cm.
The length of the prism is 20 cm.

The density of the metal is 5 g/cm³.

Calculate the mass of the prism.
Give your answer in kilograms.

$$\text{Area of trapezium} = \frac{(a+b) \times h}{2}$$

$$= \frac{(8+12) \times 6}{2} = \frac{20 \times 6}{2} = 60 \text{ cm}^2$$

$$\text{Volume of prism} = 60 \times 20 = 1200 \text{ cm}^3$$

density is 5g/cm³

meaning $\rightarrow 5g = 1 \text{ cm}^3$
 $5 \times 1200g = 12000g$

6000g

1000g = 1 kg

6000g = 6kg

6 kg
(Total 5 marks)

179

The diagram shows a triangle.

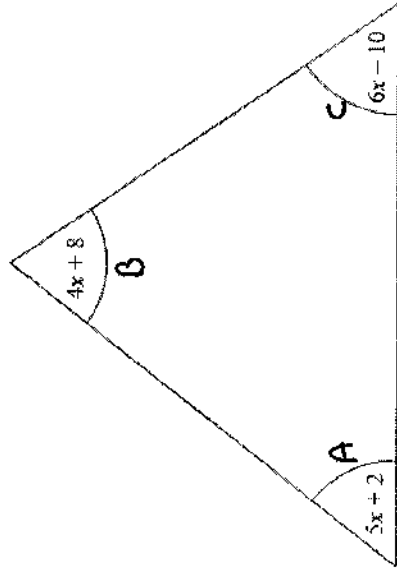


Diagram NOT
accurately drawn

All the angles are measured in degrees.

Show that the triangle is isosceles.

Angles in triangle = 180
 $\leftarrow$ two angles are the same.

$$4x + 8 + 5x + 2 + 6x - 10 = 180$$

$$15x = 180$$

$$x = \frac{180}{15}$$

$$x = 12$$

A	B	C
$5x + 2$	$4x + 8$	$6x - 10$
$= 5 \times 12 + 2$	$= 4 \times 12 + 8$	$= 6 \times 12 - 10$
$= 60 + 2$	$= 48 + 8$	$= 72 - 10$
$= 62^\circ$	$= 56^\circ$	$= 62^\circ$

(Total 5 marks)

Angles A and C are the same, so the triangle is an isosceles.

180

Here is a list of numbers.

6 9 10 15 19 27

From the numbers in the list write down

(i) the square number,

$$3 \times 3 = 9$$

9

(ii) the prime number,

number can only be divided by 1 and itself
 nothing else.

19

(iii) the cube number,

$$3 \times 3 \times 3 = 27$$

27

(Total 3 marks)

Nathan thinks of a number.

He doubles the number.

He adds 5

His answer is 17

What number does Nathan think of?

work backwards

$$17 - 5 = 12$$

Then $12 \div 2 = 6$.

Answer = $\underline{6}$

OR Form an equation with x as the unknown number.

$$2x + 5 = 17$$

$$\quad -5 \quad -5$$

$$2x = 12$$

$$\div 2 \quad \div 2$$

$$x = 6$$

(Total 3 marks)

Sally makes a fair 8-sided spinner for a game.

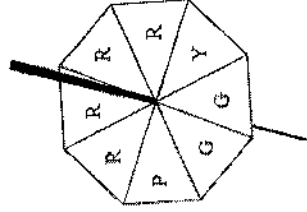


Diagram NOT
accurately drawn

Sally is going to spin the spinner once.

The spinner will land on one of the letters shown in the diagram.

impossible	unlikely	evens	likely	certain
------------	----------	-------	--------	---------

(a) From the list above, write down the word that best describes the likelihood

(i) that the spinner will land on the letter Y

Unlikely

(ii) that the spinner will land on the letter R

Evans

(iii) that the spinner will land on the letter T

Impossible

Sally makes a different fair 8-sided spinner.

The letters A, B, C and D will be on the spinner.

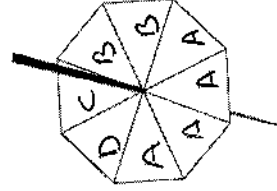
The probability that the spinner will land on A is twice the

probability that the spinner will land on B.

The probability that the spinner will land on C is the same as the

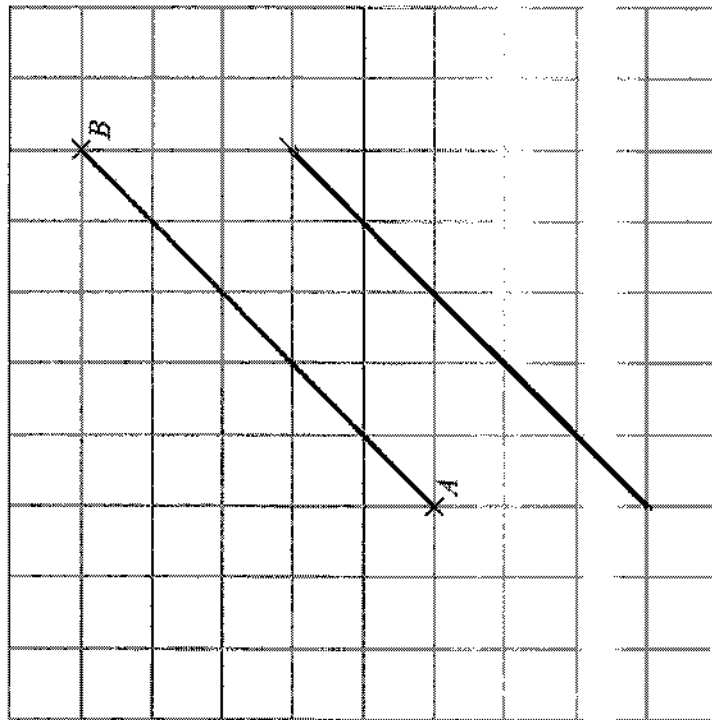
probability that the spinner will land on D.

(b) Use this information to complete the spinner.



(2)

(Total 5 marks)



On the grid, draw a line that is both
parallel to the line AB
and the same length as the line AB .

(Total 2 mark)

(a) Work out 40% of 20.

$$10\% \text{ of } 20 = 2 \quad \times 4 \rightarrow$$

$$40\% \text{ of } 20 = 8$$

8 (2)

Here are four numbers.

$$0.43 \quad \frac{3}{7} \quad 43.8\% \quad \frac{7}{16}$$

(b) Write these numbers in order of size.
Start with the smallest number.

$$\frac{3}{7} = 0.42857143$$

$$43.8\% = 0.438$$

$$\frac{7}{16} = 0.4375$$

$$0.43 = 0.43$$

In order $\frac{3}{7}, 0.43, \frac{7}{16}, 43.8\%$ (2)

(Total 4 mark)

Sarah says, ^{is odd} 13 or

"When square a prime number you always get an odd number."

(a) Write down one example to show that Sarah is wrong.

2 is prime $2^2 = 4$
4 is even

(1)

Emily says,

"The lowest number that 3 and 6 both divide into exactly is 18"

(b) Is Emily correct?

You must give a reason for your answer.

No. coz $4 \times 3 = 12$ and $2 \times 6 = 12$
lowest number they both
divide into is 12.

(1)

(Total 2 mark)

Batteries are sold in packets and in boxes.

There are 4 batteries in a packet.

There are 20 batteries in a box.

Derek buys one box of batteries.

He takes t batteries out of the box.

(a) Write down an expression, in terms of t , for the number of batteries left in the box.

$20 - t$
Box - t ← takes out

$20 - t$

(1)

Sameena buys x packets of batteries and y boxes of batteries.

(b) Write down an expression, in terms of x and y , for the total number of batteries Sameena buys.

$4x + 20y$

$4x + 20y$
(2)

(Total 3 marks)

People can buy three types of plane tickets.

They can buy

an Economy ticket
a Premium ticket
or a Business ticket

200 people buy plane tickets.

92 males buy tickets
30 of the males buy Business tickets
62 females buy Economy tickets

A total of 44 people buy Business tickets.
A total of 60 people buy Premium tickets.

How many males buy Premium tickets?
You must show all your working.

	Economy	Premium	Business	Total
MALE		(28)	30	92
FEMALE	62	(32)	(14)	(108)
Total		60	44	200

Numbers in circles are calculated.

$$\text{Female total} = 200 - 92 = 108$$

$$\text{Female Business} = 44 - 30 = 14$$

$$\text{Female Premium} = 108 - (62 + 14) = 32$$

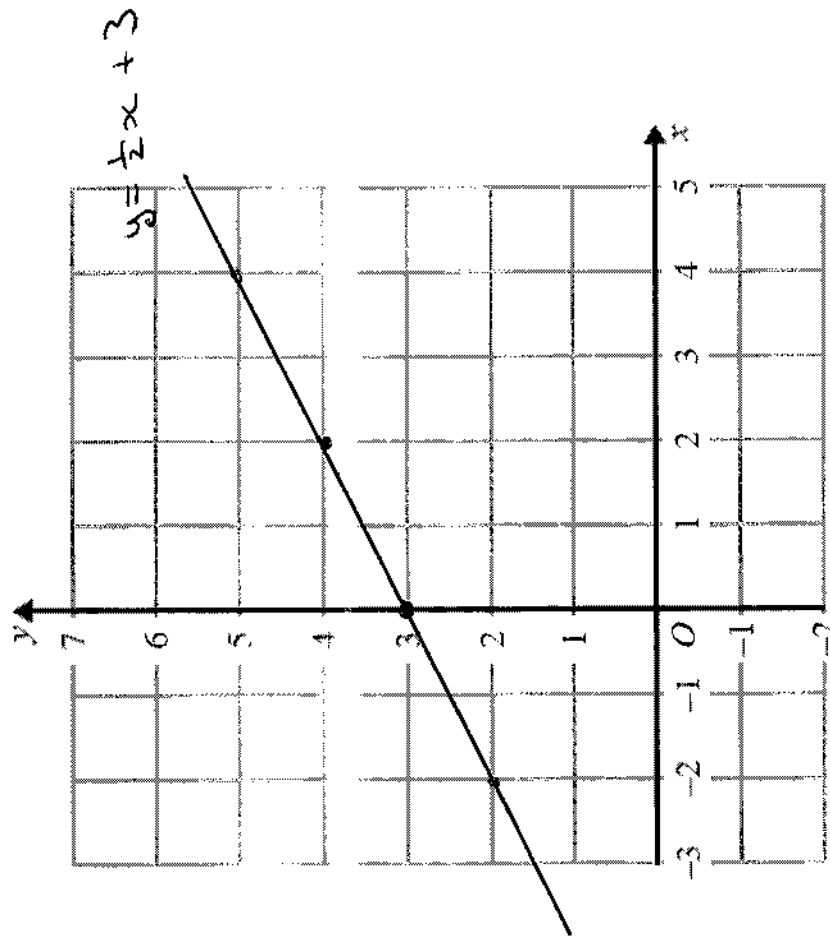
(Total 4 marks)

ANS

$$\text{Premium male} = 60 - 32 = 28$$

On the grid, draw the graph of $y = \frac{1}{2}x + 3$ for values of x from -2 to 4.

x	-2	-1	0	1	2	3	4
y	2	2.5	3	3.5	4	4.5	5



(Total 3 marks)

Here are the ingredients needed to make 10 pancakes.

Pancakes	
Ingredients to make 10 pancakes	
300 ml	of milk
120 g	of flour
2	eggs

Matthew makes 30 pancakes.

(a) Work out how much flour he uses.

$$120 \text{ g} \times 3 = 360 \text{ g}$$

$$\text{so } 120 \text{ g} \times 3 = 360 \text{ g}$$

$$360 \dots \pounds \dots (2)$$

Tara makes some pancakes.
She uses 750 ml of milk.

(b) Work out how many pancakes she makes.

$$750 \div 300 = 2.5$$

so 2.5 ~~sets~~ 'sets' of ingredients.

$$\therefore 2.5 \times 10 \text{ pancakes} = 25 \text{ pancakes}$$

$$25 \dots (2)$$

(Total 4 marks)

£360 is shared in the ratio 1 : 3 : 5

Work out the difference between the largest share and the smallest share.

$$1 + 3 + 5 = 9 \text{ shares}$$

$$1 \text{ share } \pounds 360 \div 9 = \pounds 40$$

$$\therefore 1 \text{ share} = \pounds 40$$

$$5 \text{ shares} = \pounds 200$$

Difference between largest and smallest.

$$\pounds 200 - \pounds 40 = \pounds 160$$

$$\pounds 160$$

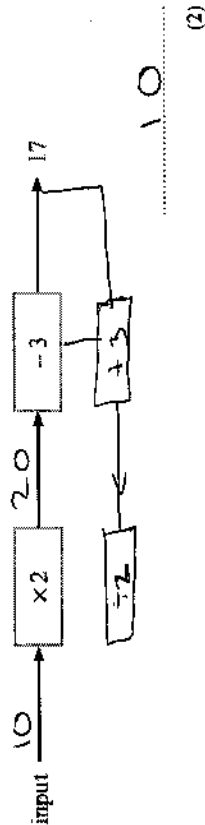
(Total 3 marks)

(a) Work out the output for this number machine.



..... (2)

(b) Work out the input for this number machine.



(c) The input for this number machine is m .



Find an expression, in terms of m , for the output.

..... (2)

(d) The output for this number machine is n .



..... (2)

(Total 8 marks)

Jenny wants to record 15 minutes of songs for a film. The table shows the playing time of 3 songs she has recorded.

Song	Playing time
A	4 minutes and 33 seconds
B	3 minutes and 42 seconds
C	3 minutes and 06 seconds

How much more time, in minutes and seconds, does she need to record?

Minutes $4 + 3 + 3 = 10$ minutes

Seconds $33 + 42 + 6 = 81$ seconds

$\rightarrow = 1 \text{ minute } 21 \text{ seconds}$

Total time = 11 minutes 21 seconds.

15 minutes — 11 minutes 21 seconds

= 3 minutes 39 seconds.

..... minutes seconds
(Total 4 marks)

The table gives some information about the costs of posting large letters.

First Class Post - Delivery takes 1 to 2 days	
Weight (g)	Cost
50 - 100	50p
101 - 250	72p
251 - 500	£1.04
501 - 750	£1.51

Second Class Post - Delivery takes 3 to 5 days	
Weight (g)	Cost
50 - 100	40p
101 - 250	59p
251 - 500	85p
501 - 750	£1.23

Leroy works for a company.

In January he sends some large letters by first class post.

The table gives information about numbers and weights of the large letters.

(a) Calculate the total cost of sending these large letters by first class post.

$$\begin{aligned}
 50 \times 28 \times 50p &= \pounds 14.00 \\
 32 \times 72p &= \pounds 23.04 \\
 50 \times \pounds 1.04 &= \pounds 52.00 \\
 18 \times \pounds 1.51 &= \pounds 27.18
 \end{aligned}$$

In February, Leroy is going to send some more large letters. The table gives information about the weights and numbers of these large letters.

$$\pounds 116.22 \dots (3)$$

Weight (g)	Number of large letters
50 - 100	32
101 - 250	40
251 - 500	68
501 - 750	34

Leroy can use either first class post or second class post.

He thinks it will cost £20 less to send the letters by second class post.

(b) Is Leroy correct?

You must show your working.

1st class

$$\begin{aligned}
 32 \times 50p &= \pounds 16 \\
 40 \times 72p &= \pounds 28.80 \\
 68 \times \pounds 1.04 &= \pounds 70.72 \\
 34 \times \pounds 1.51 &= \pounds 51.34
 \end{aligned}$$

$$\text{Total } \pounds 166.86$$

(4)
(Total 7 marks)

2nd class

$$\begin{aligned}
 32 \times 40p &= \pounds 12.80 \\
 40 \times 59p &= \pounds 23.60 \\
 68 \times 85p &= \pounds 57.80 \\
 34 \times \pounds 1.23 &= \pounds 41.82
 \end{aligned}$$

$$\text{Total } \pounds 136.02$$

$$\text{Difference of } \pounds 30.84$$

$$-2 < n \leq 3$$

n is an integer.

(a) Write down all the possible values of n .

$-1, 0, 1, 2, 3$

(2)

x is a number.

Another number is 9 greater than x .

Both numbers are whole numbers.

The total of the two numbers is less than 60

(b) Find the greatest possible value of x .

$$x + x + 9 < 60$$

$$2x + 9 < 60$$

$$2x < 51$$

$$x < 25.5$$

Greatest value possible for x is

$$\underline{25}$$

(3)
(Total 5 marks)

The n th term of sequence A is $3n - 2$
 The n th term of sequence B is $10 - 2n$

Sally says there is only one number that is in both sequence A and sequence B.

Is Sally right?

You must explain your answer.

$$3n - 2$$

$$\text{Number } 3 \times 1 - 2 = 1$$

$$3 \times 2 - 2 = 4$$

$$3 \times 3 - 2 = 7$$

$$3 \times 3 - 2 = 10$$

So sequence is 1, 4, 7, 10, 13, 16, 19.

$$10 - 2n$$

$$10 - 2 \times 1 = 8$$

$$10 - 2 \times 2 = 6$$

$$10 - 2 \times 3 = 4$$

$$10 - 2 \times 4 = 2$$

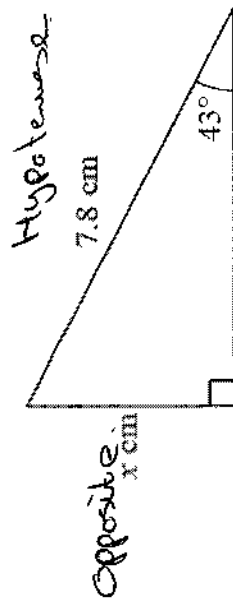
So sequence is 8, 6, 4, 2, 0, ...

It is only number in common.

(Total 2 marks)

They will not cross again as one goes up the other goes down.

Diagram NOT
accurately drawn



Work out the value of x .
 Give your answer correct to 3 significant figures.

$$\sin x = \frac{O}{H}$$

$$\sin 43^\circ = \frac{x}{7.8}$$

$$7.8 \times \sin 43^\circ = x$$

$$x = 5.319587208$$

$$x = \underline{\underline{5.32 \text{ cm}}} \quad (3 \text{ s.f.})$$

$$x = \underline{\underline{5.32}}$$

(Total 3 marks)

Here is a formula used to work out the speed, v mph, of a car making an emergency stop.

$$v = \sqrt{21d}$$

d feet is the length of the mark the car's tyres make on the road when making an emergency stop.

A car makes an emergency stop.

The car's tyres make a mark 90 feet long.

(a) Work out the speed of the car.

Give your answer correct to the nearest whole number.

$$v = \sqrt{21 \times 90}$$

$$v = \sqrt{1890}$$

$$v = 43.047413$$

$$v = \underline{\underline{43 \text{ mph}}}$$

$$\underline{\underline{43}} \dots \text{mph} \quad (2)$$

A car made an emergency stop.

The car's speed was 50 mph.

(b) Work out the length of the mark on the road.

Give your answer correct to the nearest whole number.

$$v = \sqrt{21d}$$

$$50 = \sqrt{21d}$$

$$50^2 = 21d$$

$$2500 = 21d$$

$$\frac{2500}{21} = d$$

$$119 = d$$

$$\underline{\underline{119}} \dots \text{feet} \quad (3)$$

(Total 5 marks)

Andy has some counters.

15% of the counters are red.

$\frac{2}{5}$ of the counters are blue.

The rest of the counters are yellow.

There are 27 yellow counters.

How many blue counters are there?

$$2/5 = 40\%$$

$$100 - 40 - 15$$

↓

so 45% Yellow

15% Red 40% Blue

$$45\% = 27 \div 9 \rightarrow 5\% = 3$$

If 5% = 3 and 40% are blue.

$$\begin{aligned} \text{Blue} &= 8 \times 5\% = 40\% \\ &= 8 \times 3 = \underline{\underline{24 \text{ Blue}}} \end{aligned}$$

$$\underline{\underline{24}}$$

(Total 5 marks)

199

Here is a diagram of Gareth's lawn.

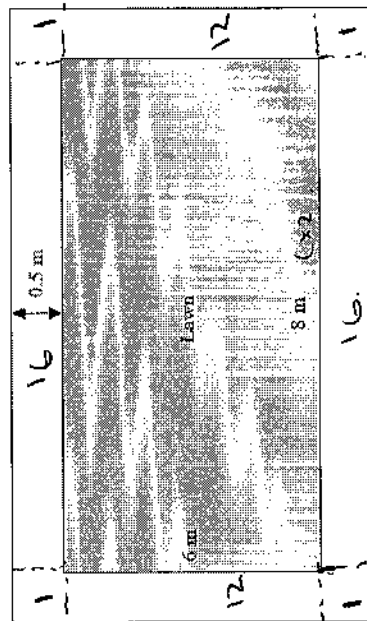


Diagram NOT
accurately drawn

The lawn is in the shape of a rectangle. The length of the lawn is 8 m.
The width of the lawn is 6 m.

There is a path all the way around the lawn. The path is made from paving slabs.
Each paving slab is a square 0.5 m by 0.5 m. The width of the path is 0.5 m.

Work out the number of paving slabs in the path.

There are 16 slabs in 8m
as $16 \times 0.5 = 8$
then are 12 slabs in 6m
as $12 \times 0.5 = 6$.

Plus 1 in each corner.

$$16 + 16 + 12 + 12 + 1 + 1 + 1 + 1 = 60$$

(Total 3 marks)

200

The diagram shows an accurate scale drawing of part of the boundary of a field.
The complete boundary of the field is in the shape of a quadrilateral ABCD.

AB = 300 metres.

BC = 230 metres.

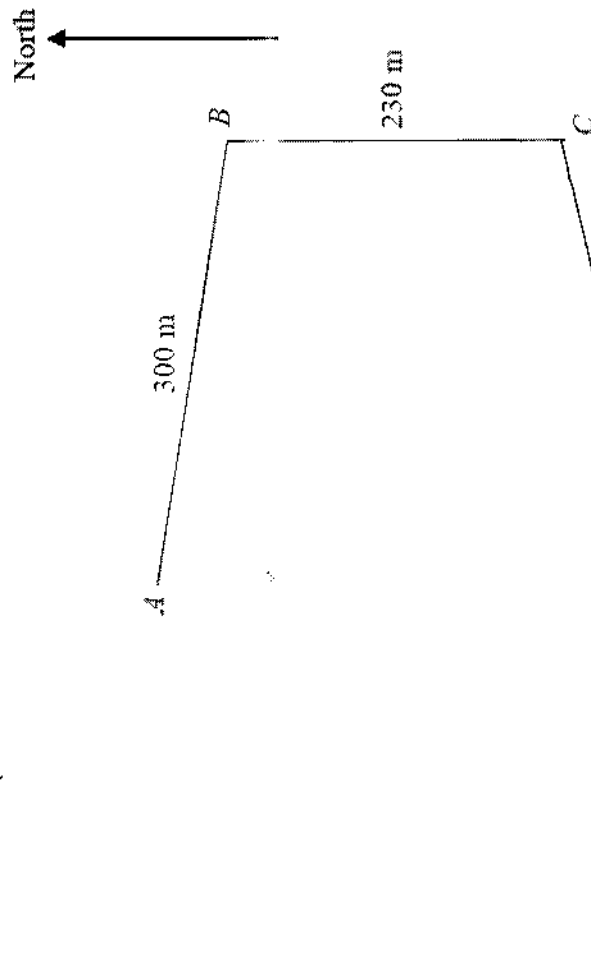
Point B is due north of point C.

The scale of the diagram is 1 cm to 50 metres.

The bearing of D from C is 260° .

AD = 480 metres.

Complete the scale drawing of the boundary of the field.
Mark the position of D.



9.6m

(Total 2 marks)