MathsMadeEasy

GCSE Mathematics

Calculator

Foundation Tier

Free Practice Set 5

1 hour 30 minutes

ANSWERS

Marks shown in brackets for each question (2)

Typical Grade Boundaries

C	D	E	F	G
76	60	47	33	20

Legend used in answers

Green Box - Working out

5b means five times b
b = – 3 so 5 × – 3 = –15

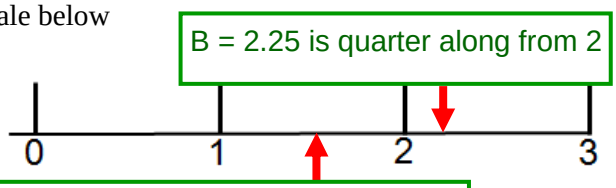
Red Box and ✓ - Answer

48 % ✓

Authors Note

Every possible effort has been made to ensure that everything in this answer paper is accurate and the author cannot accept responsibility for any errors.

1. Look at the scale below



B = 2.25 is quarter along from 2

A = 1.5 is halfway between 1 and 2

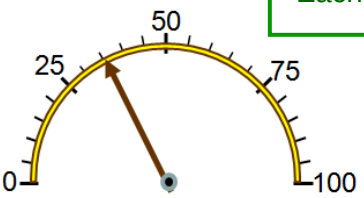
Make a mark on the scale at the following values. **(1)**

a) 1.5 and label it A **(1)**

b) 2.25 and label it B

Look at the scale below.

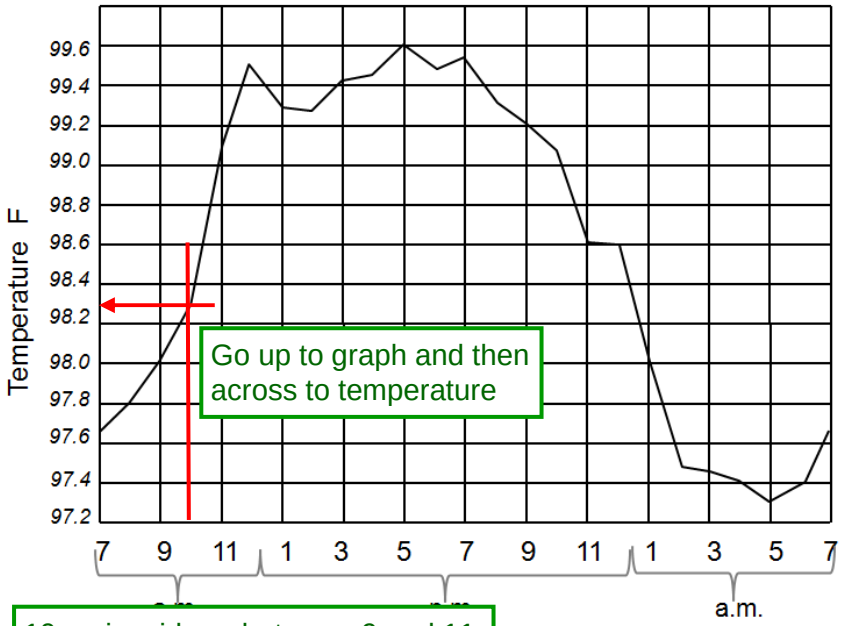
Each small division = 5



c) Write down the reading on the scale. **(1)**

..... 35

2. The graph shows the change in human body temperature over one day



Go up to graph and then across to temperature

10am is midway between 9 and 11

a) What was the temperature at 10am **(1)**

..... 98.3 °F

b) What is the range of temperatures. **(2)**

Range is highest – smallest = 99.6 – 97.3 = 2.3

. ..... 2.3 °F

3. Look at the numbers below

5	6	7	8	11	24	49

Which number is

a) a multiple of 12 — In the 12 times table — **24** ✓ (1)

b) a factor of 21 — Goes into 21 — **7** ✓ (1)

c) a square number — 7 × 7 — **49** ✓ (1)

d) square root of 36 — $\sqrt{36}$ — **6** ✓ (1)

4. The conversion graph is used to change between pounds and kilograms

a) Use the graph to change 5 kilograms into pounds

11 ✓ pounds (1)

b) What is 40 pounds in kilograms

20 pounds = 9.1 so 40 pounds = 18.2 kg

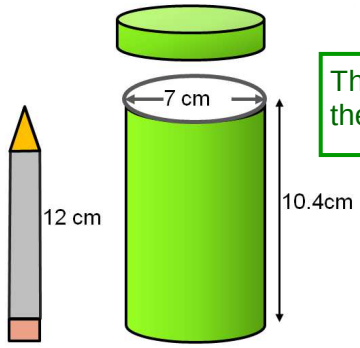
18 to19 ✓ kg (1)

c) What is 100 kilograms in pounds

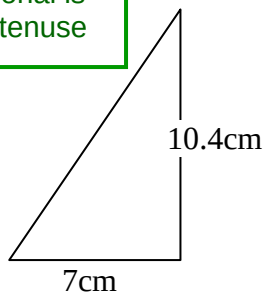
10kg = 22 pounds so 100 kg = 220 pounds

220 ✓ pounds (1)

5. Sylvia had a pencil-case in the shape of a cylinder with the dimensions shown.
The pencil case had a tight top that fitted snugly.
She wanted to put a 12 cm pencil in her pencil-case.



The diagonal is the hypotenuse



a) Work out if the pencil will fit in the pencil-case diagonally with the top on.
Ignore the width of the pencil.
Show all your working

Use Pythagoras to see if the hypotenuse is at least 12 cm

Hypotenuse^2 = $10.4^2 + 7^2$ = 108.16+49 = 157.16
$\sqrt{157.16} = 12.53$

(3)

The 12cm pencil will fit as the diagonal distance is 12.5cm ✓

6. Parminder bought some supplies from the Cash and Carry.

Complete her bill:

Cash and Carry store			
Description	Number	Cost of each item	Total
Bottles of orange juice	9	£1.20	£10.80
Packets of crisps	**15** ✓	£0.27	£ 4.05
Pair of Jeans	3	£. **11.50** ✓	£34.50
Pair of socks	3	£1.54	£ **4.62** ✓
Total cost			£. **53.97** ✓

(4)

Crisps: 4.05 ÷ 0.27 ; Jeans 34.50 ÷ 3 ; Socks 3 × 1.54

7. The formula below converts temperature in degrees Centigrade to degrees Fahrenheit

$$F = \frac{C \times 8}{5} + 32$$

F = temperature in Fahrenheit
C = temperature in Centigrade

a) Use the formula to convert 90° C to °F

Put 90 in place of C in the formula:

$F = \frac{90 \times 8}{5} + 32 = F = \frac{720}{5} + 32 = F = 144 + 32$

176 ✓

..... °F **(3)**

b) David measured the temperature of some water. It was 128° F.
Calculate the temperature in °C

Put 128 in place of F in the formula:

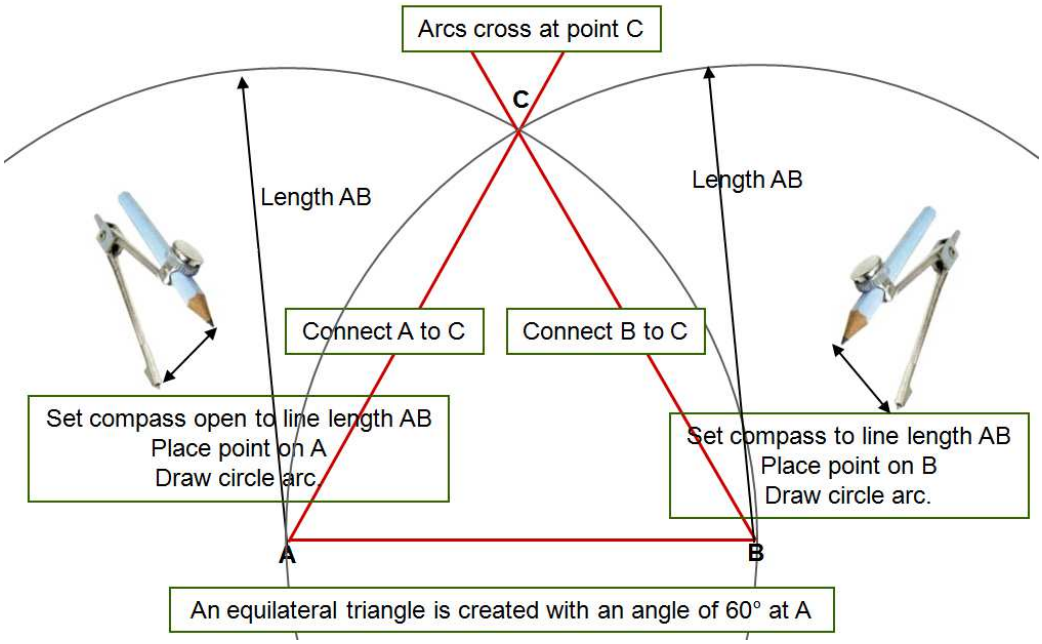
$128 = \frac{C \times 8}{5} + 32$ so $128 - 32 = \frac{C \times 8}{5}$

$96 = \frac{C \times 8}{5}$ so $96 \times 5 = C \times 8$ so $480 = 8C$

60 ✓

..... °C **(3)**

8. A horizontal line AB is drawn below



(2)

a) Using a compass and pencil construct an angle of **60°** at point A

9. A shop pays all its workers the minimum national wage (MNW) set by the government.

There are different levels of MNW, depending on your age.
The current rates (from 1 October 2011) are:

£6.08 - the main rate for workers aged 21 and over
£4.98 - the 18-20 rate
£3.68 - the 16-17 rate for workers above school leaving age

a) Josh is 16 and Olivia is 18. They both work in the shop on Saturday from 9am to 4pm.

How much more will Olivia get than Josh

9am to 4pm = 7 hours

Josh gets £3.68 per hour. 3.68 × 7 hours = £25.76

Olivia gets £4.98 per hour. 4.98 × 7 hours = £34.86

The difference is £34.86 - £25.76 = £9.10

£..... **9.10** ✓ **(4)**

10. Using your calculator work out

a) $\frac{12.6}{3} + 8.4$

Do 12.6 ÷ 3 first then add 8.4

..... **12.6** ✓ **(1)**

b) $\frac{8.3^2 - 2}{5}$

Give your answer to one decimal place

Do top line first, then divide by 5 = 13.378.
This is closer to 13.4 than 13.3

..... **13.4** ✓ **(2)**

11. a) Using the equation shown below, complete the table of values.

Replace x with the values in the table to find y

$$y = x\left(\frac{x}{20} + 1\right)$$

x	0	10	20	30	40	50	60
y	0	15	**40** ✓	75	120	**175** ✓	240

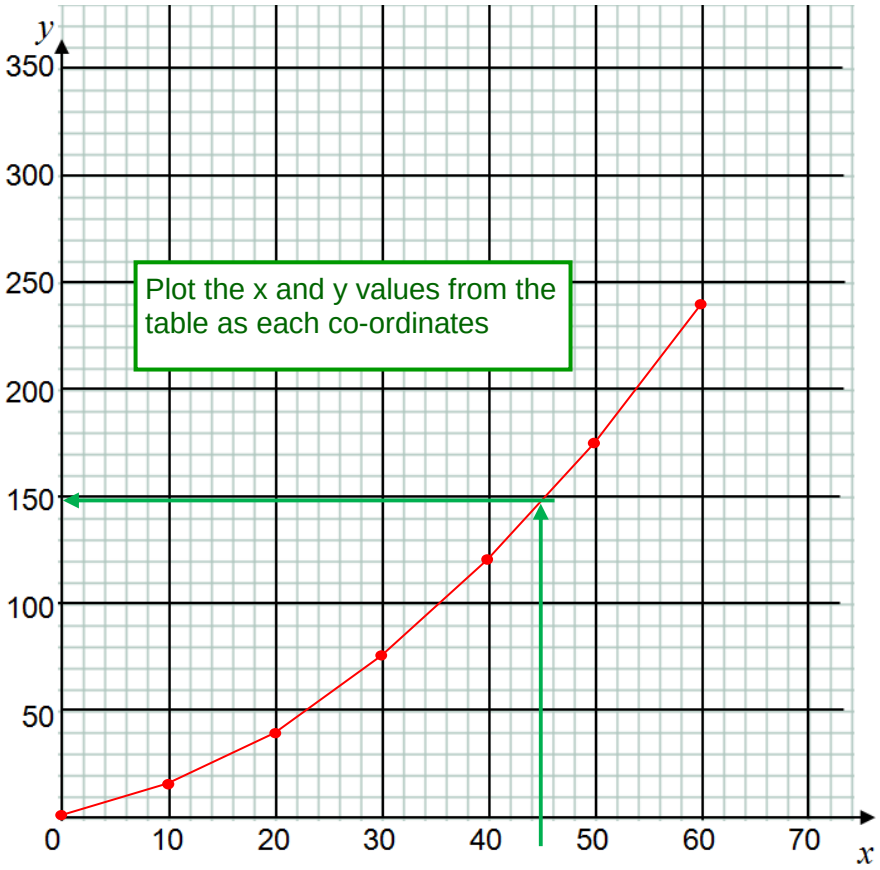
(1)

20 × (20 ÷ 20 + 1) = 20 × 2 = 40

50 × (50 ÷ 20 + 1) = 50 × 3½ = 175

b) Plot the co-ordinates on the graph paper below and join up the points

(2)



The stopping distance S (in feet) of a car is calculated using this formula :

$$S = \frac{x^2}{20} + x$$

This is the same as the graph shown above

x is the speed in mph.

b) Using the graph estimate the *stopping distance* S for a car with a speed of 45mph

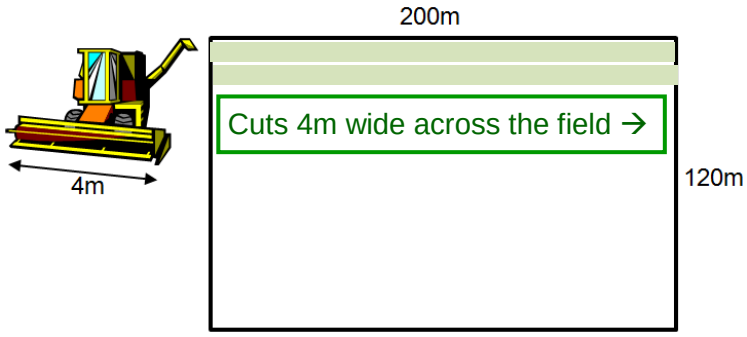
Draw a line from x = 45. It meets the vertical axis at just less than 150ft

145-150 ✓ .feet

(2)

12. A farmer needed to harvest the crops in a field.

The field was 200m by 120m
The farmer used a combine harvester with a blade cutting width of 4m for each cut *across* the field



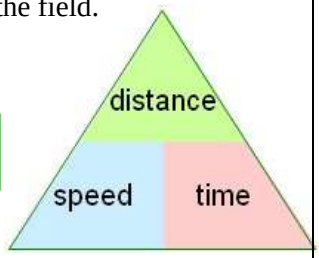
a) How many cuts would the farmer need to make to harvest the field

To find the number of cuts divide 120 by 4m
as we are cutting horizontally across the field

30 ✓ cuts **(2)**

The combine harvester had a speed of 4.8km per hour.

b) How long would it take the farmer to harvest crops in the field.
Give your answer in hours and minutes



Use the speed-distance–time triangle to work out the time

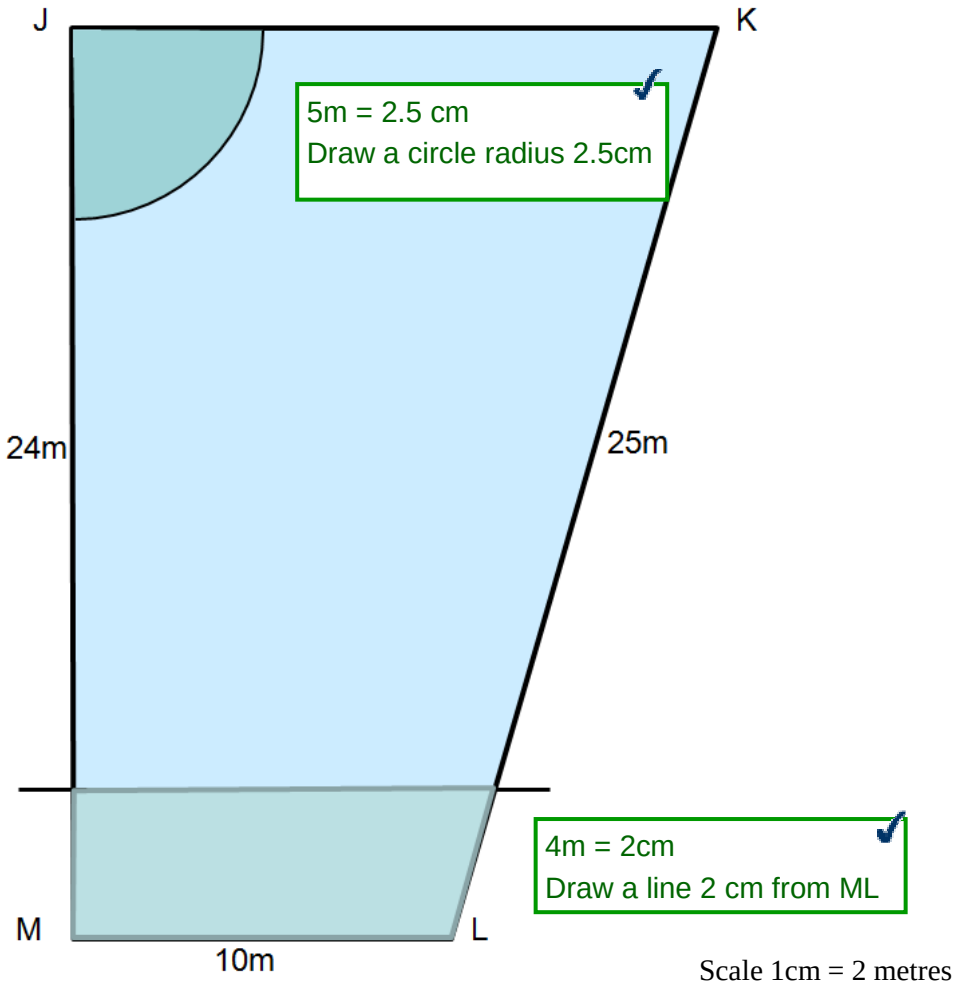
Distance : 30 cuts each 200m long gives 6000m = 6km

Time = distance ÷ speed make sure everything is in km
6km ÷ 4.8km/hr = 1.25 hours

1.25 hours is 1 hour and a quarter (15mins) NOT 1 hour 25 min

1 ✓ hr **15** ✓ min **(3)**

13. A plan of the swimming pool is shown below.



a) Calculate the area of the swimming pool

Area formula is for a trapezium
Area = (10 + 17) ÷ 2 × 24 = 13.5 × 24 = 324

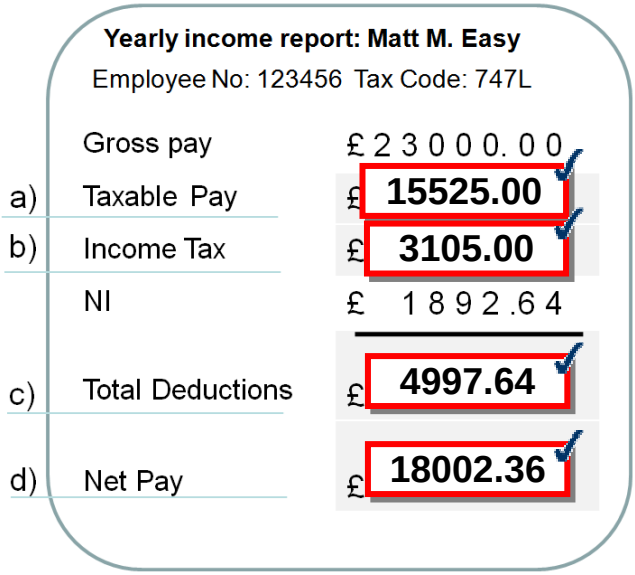
324 ..m^2 **(2)**

One area of the pool is for toddlers to paddle and another area is for adults only.

The toddlers paddling area is within 5 metres of the corner J
The adult area is within 4 metres of the side ML

b) Draw these two areas accurately on the plan. **(4)**

14. Matt's looked at his yearly income statement below and noticed some values were missing.



His taxable pay is worked out using the tax code 747L.
This means, he is doesn't have to pay tax on £7475 of his gross pay.

Use the following formula to complete Matt's income statement

a) Taxable Pay = Gross Pay – £7475.
Work out Matt's Taxable Pay and enter it above. **(1)**

23000 – 7475 =

b) Matt's Income tax is 20% of his Taxable Pay.
Work out Matt's Income tax and enter it above. **(2)**

15525 × 0.2 =

c) Matt's Total Deductions = Income Tax + NI (national Insurance)
Work out Matt's Total Deductions and enter it above. **(1)**

3105 + 1892.64 =

d) Net Pay = Gross pay – Total deductions.
Work out Matt's Net Pay and enter it above. **(1)**

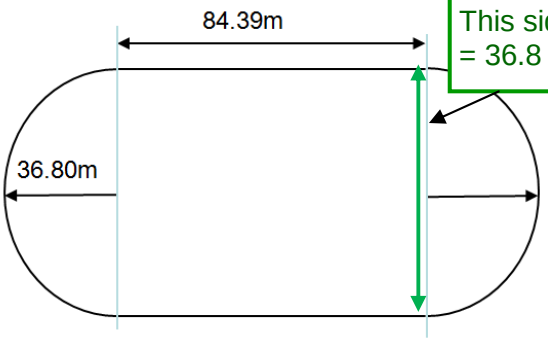
23000 – 4997.64 =

e) What percentage of his gross pay is deducted. **(1)**

4997.64 ÷ 23000 = 0.2173

21.7 %

16. In 2012, the United Kingdom hosted the Olympic Games in London.
The standard running track is shaped like this:



This side is twice the radius
= 36.8 × 2 = 73.6

The standard running track is made from two semi-circles at each end joined by two straights.

For the inside running lane, the radius of each circle is 36.80m and the two straights are 84.39m each as shown below.

a) Calculate the area of the running track.
Give your answer to nearest whole number

The area is a rectangle 84.39 × 73.6 = 6211.1

Plus the area of circle = π × 36.8^2 = 4254.5

10466 ..m^2 **(4)**

b) Show that the perimeter is 400m.

2 sides: 84.39 × 2 = 168.78m

Two semi-circle ends make a circle.
Perimeter of a circle = π × diameter = 3.142 × 36.08 × 2 = 226.72m

168.78 + 226.72 = 400.00m

(4)

The Olympic Marathon is over 42 kilometres long.
A runner can lose over 3 ½ litres of sweat during a marathon.

This water must be replaced and so cups of water are handed out along the race.
Each cup holds $\frac{1}{8}$ litre.

c) How many cups of water should a runner drink during the race?

How many $\frac{1}{8}$ are there in 3 ½

There are 8 in 1 litre and we have 3 ½ litres

8 + 8 + 8 + 4 = 28

28 ✓ cups **(2)**

d) After drinking *one litre* of water approximately how far would a runner have gone. Give your answer to the nearest km.

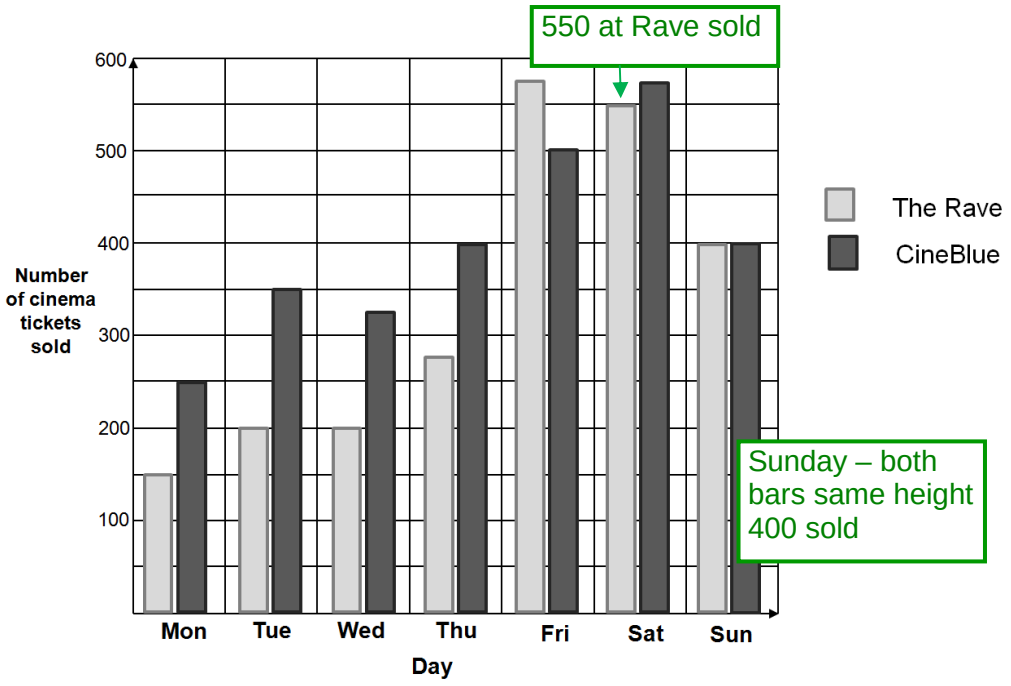
A runner drinks 28 cups in the marathon

One litre is 8 cups so the runner has gone $\frac{8}{28}$ or $\frac{2}{7}$ of the distance

$\frac{2}{7} \times 42 = 12$ km

12 ✓ km **(1)**

17. The chart shows the number of cinema tickets sold at two cinemas in a week



a) On which day were the same number of tickets sold at both cinemas

Look for a day when both bars are the same height

..... **Sunday** ✓ **(1)**

b) What was the total number of tickets sold at the Rave at the weekend

550 + 400 = 950

..... **950** ✓ **(1)**

c) Work out the mean number of tickets sold at CineBlue for the seven days

Mean = add up all tickets for seven days ÷ number of days

250 + 350 + 325 + 400 + 500 + 575 + 400 = 2800

2800 ÷ 7 = 400

..... **400** ✓ **(2)**

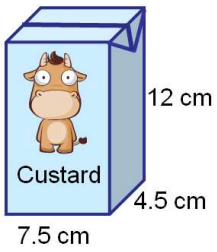
d) The normal ticket price is £5.40 at CineBlue
On a Thursday CineBlue has a special offer – two for the price of 1
How much money did CineBlue take on Thursday

Thursday – sold 400 tickets
Two for 1 means they took money for 200 tickets

200 tickets × 5.40 = 1080

£..... **1080** ✓ **(2)**

18. A carton of custard is in the shape of a cuboid as shown.
The carton measures 12 cm high, 7.5 cm wide and 4.5 cm deep.



a) Work out the volume of the carton.

Volume = height × width × depth
12 × 7.5 × 4.5

..... 405 ✓ cm^3 **(2)**

The custard company wants to design a new larger carton to hold $1000cm^3$ of custard.

The base of the carton is a square and the height is 10cm *more* than the width as shown.

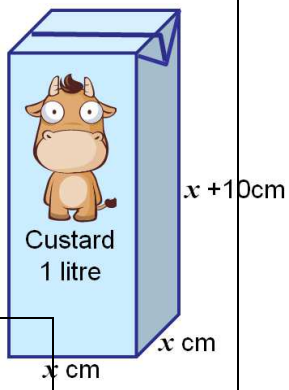
The volume of a cartoon is given by

$V = x^3 + 10x^2$ where x is the base width

Pick a number → Cube the number → Square the number Multiply by 10 → Add the values from last two steps → Check how close to target and repeat with new value

b) Using trial and improvement work out x for a volume V of $1000cm^3$
Give your answer to one decimal place.
You must show **all** your working.

Target = 1000



Make a guess for x.
Start with 5cm

Target not reached – try bigger x

x	x^3	$10x^2$	V=
5	5 x 5 x 5 = 125	5 × 5 × 10 = 250	125+250=375
7	7 x 7 x 7 = 343	7 × 7 × 10 = 490	343+490=833
8	8 x 8 x 8 = 512	8 × 8 × 10 = 640	512+640=1152
7.5	7.5×7.5×7.5 = 421.9	7.5×7.5×10 = 562.5	421.9+562.5=984.4
7.6	7.6×7.6×7.6 = 439	7.6×7.6×10 = 577.6	434+577.6=1016.6

Too low or high try x between 7 and 8

Closest

x = . 7.5 ✓ .cm **(4)**

Laura wants to make her own custard.
She uses the recipe below for 4 people

300ml milk
½ tea spoon vanilla extract
2 eggs, yolks only
15 grams sugar

d) How much milk would she need to make custard for 10 people

for 4 people need 300ml
for 1 person need 300 ÷ 4 = 75ml
for 10 people need 75 × 10 = 750ml

750 ml **(2)**

How much vanilla essence would she need to make custard for 2 people
Give your answer as a fraction

Two people means we halve the ingredients
So half of ½ is ¼

¼ tea spoon **(1)**

19. A group of 16 university students hired a mini-bus for the day.

The mini-bus cost £40 per day plus an extra charge for mileage.

Between 0-100 miles this was 82p per mile and above 100 miles it was 41 p per mile.
The mileage reading at the start of the trip was 32, 863 and 33, 050 at the end of the trip.

Each student paid £10. How much profit or loss did the trip make?

Work out distance travelled 33050 – 32863 = 187

The first 100 miles cost 100 × 82 = £ 82.00
The next 86 miles cost 87 × 41 = £ 35.67
Total cost for mileage £117.67

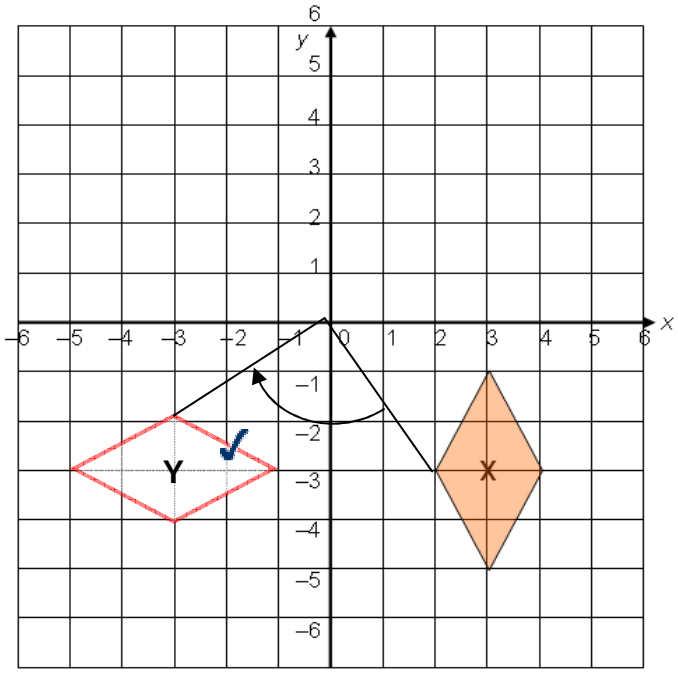
Total cost of hire - +£40 £157.67

Each student paid £10, so 16 students paid £160

Profit = £160 – 157.26 = £2.33

£ 2.33 **(4)**

20. Rotate shape **X** by 90^0 clockwise about the origin (0, 0). Label it shape Y



(3)

21. Cyril had a pack of 48 playing cards.

Each card in the pack was either black or red with a circle, square, triangle or rectangle symbol. The table below shows this information.

Symbol	Circle	Square	Triangle	Rectangle
Colour	Black	Black	Red	Red
Number of cards	10	11	14	13

Cyril picked one card at random.

a) What was the chance of picking a card with a triangle symbol
Give your answer as a fraction in its simplest form

There are 14 triangle cards out of 48 cards

..... $\frac{7}{24}$ ✓ **(1)**

b) A black card was picked. What is the probability that it is a square.

There are 11 square cards out of 21 black cards

..... $\frac{11}{21}$ ✓ **(1)**

Cyril took the circle cards from the pack. They were numbered 10 to 19.
He picked one card at random.

c) What is the probability of picking a card with a prime number

There are 10 circle cards.
Ther are 4 Prime numbers : 11, 13, 17, 19

..... $\frac{4}{10}$ **(1)**

Cyril had a different pack of 50 playing cards.

Each card in the pack was either green or blue with a circle, square, triangle or rectangle symbol. The table below shows the probability of picking a card.

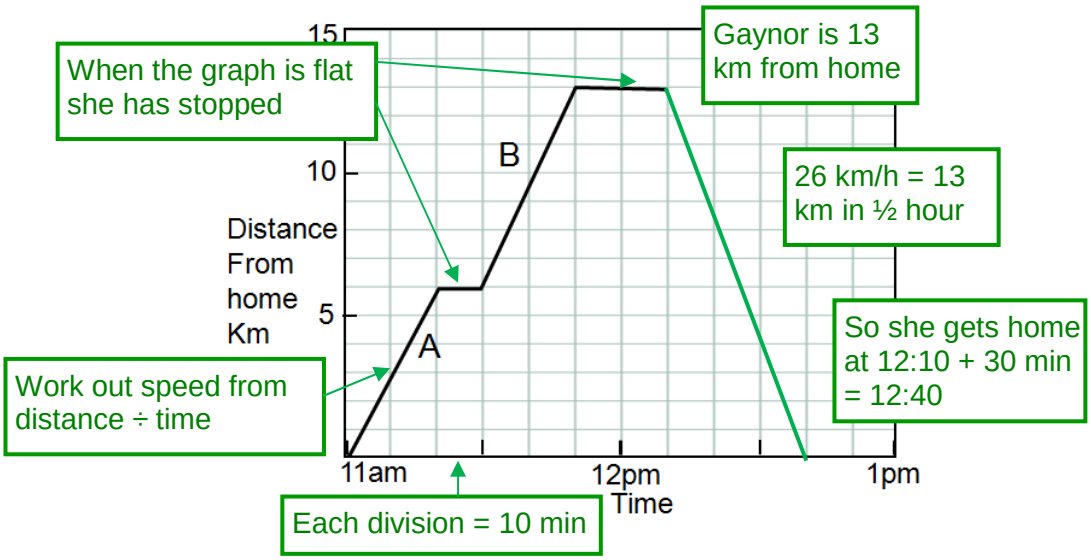
Symbol	Circle	Square	Triangle	Rectangle
Colour	Green	Green	Blue	Blue
Probability of picking cards	2x	x	3x	4x

d) How many **blue, triangle** cards were in the pack

There are 3x blue triangle cards and 10x cards in total
So 3 in 10 is a blue triangle. Out of 50 cards that are 15

..... **15** ✓ **(2)**

22. The graph shows how far Gaynor travelled on her bike ride.
The first part of her journey was uphill.



a) How many times did she stop for a rest?

..... **2** ✓ **(1)**

b) Calculate Gaynor's speed for the parts of the graph labelled A and B
Give your answer in kilometres per hour.

A: speed is distance ÷ time = 6 km ÷ $^1/_3$ hour = 18 km in 1 hour

B: speed is distance ÷ time = 7 km ÷ $^1/_3$ hour = 21 km in 1 hour

A ..... **18** ✓ ....km/hr **(2)**

B ..... **21** ✓ ...km/hr

c) At 12:10 Gaynor rode home downhill at a speed of 26 km per hour.
What time did she arrive home.

26 km/h = 13 km in ½ hour

She starts at 13 km from home
It will take her 30 minutes

..... **12:40** ✓ **(2)**