

GCSE Mathematics Calculator Higher Tier Mock 3, paper 2 **ANSWERS**



1 hour 45 minutes

Legend used in answers

Blue dotted boxes – instructions or key points

Start with a column or row that
has only one number missing

Green Box - Working out

5b means five times b
b = -3 so $5 \times -3 = -15$

Red Box and ✓ - Answer

48 % ✓ 24

Marks shown in brackets for each question (2)

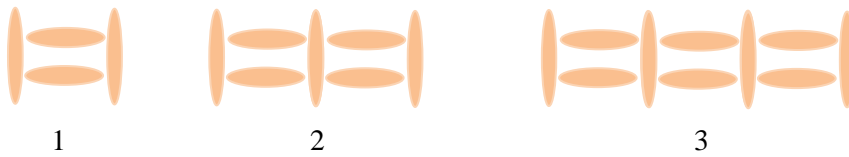
Authors Note

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

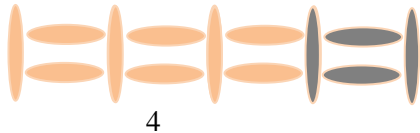
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1. Look at these patterns made from shapes



a) Complete Pattern number 4 below



b) Complete the table

Pattern	2	3	4	5	6
Number of shapes	7	10	13	16	19

c) How many shapes are in pattern 8

25

(1)

(1)

(1)

2. Put these numbers in order of size starting with the smallest.

$\frac{3}{4}$

70%

$\frac{7}{9}$

0.72

$\frac{5}{7}$

5th

1st

4th

3rd

2nd

(2)

3. a) What is 365 to the nearest 10.

370

b) What is 45678 to the nearest 1000

46000

(1)

(1)

4. a) Use your calculator to work out.

$$\frac{55}{17 - 13.2}$$

Write down all the figures on your calculator display.
Give your answer as a decimal.

14.4736842

(2)

- b) Use your calculator to work out.

$$\frac{\sqrt{19.6}}{7.3 \times 0.52}$$

Write down all the figures on your calculator display.
Give your answer as a decimal.

1.1662773

(2)

- c) Write your answer to b) correct to 1 decimal place

1.2

(1)

5. The equation

$$x^3 + 4x = 61$$

has a solution between 3 and 4

Find this solution using a trial and improvement method.

Give your answer correct to 1 decimal place.

You must show **all** your working.

3 x^y 3 + 4 x 3 =

Use x^y button to cube

x	x^3	$+4x$	=	61?
3	27	+12	39	Too low
4	64	+16	80	Too high

61 is about half way between 3 and 4 so try $x=3.6$

3.5	42.87	14	56.87	Too low
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Slightly low so try 3.6

3.6	46.66	14.4	61.05	Too low
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3.6 looks correct but try 3.7 to be sure

3.7	50.65	14.8	65.45	Too high
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$x = 3.6$ (4)

6. Laura goes on holiday to Thailand
The exchange rate is £1 = 64.5 Baht

She changes £350 into Baht

a) How many Baht will she get?

22575

.....Baht (2)

On her return Laura changes 1600 back in pounds.
The exchange rate is now £0.015 = 1 Baht.

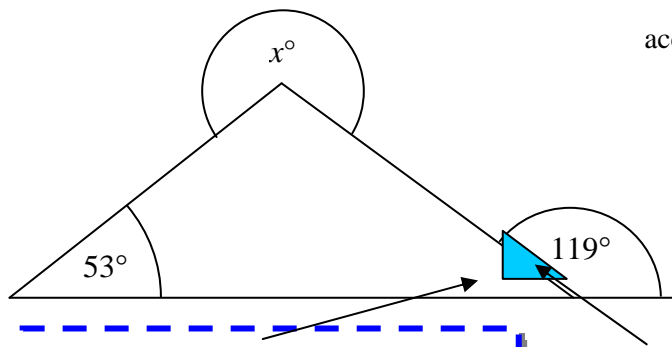
b) How much money did she get?
Give your answer to the nearest penny.

24.00

£..... (2)

7.

Diagram NOT accurately drawn



Work out the value of x

This line is 180 degrees

So this angle is $180 - 119 = 61$

Now we can work out the other angle in the triangle

Angle in triangle add up to 180 degrees

So other angle in triangle is $180 - 53 - 61 = 66$

At the top we have a circle has 360 degrees

(3)

So top angle outside triangle is $360 - 66$

$x = \dots\dots$ **294**

b) A regular pentagon has an angle x as shown.

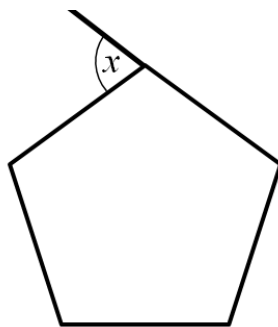


Diagram not drawn accurately

(1)

i) What type of angle is the angle at x .

..... **Acute**angle

ii) Calculate the size of the angle x
Show all your working.

$360 \div 5 = 72$

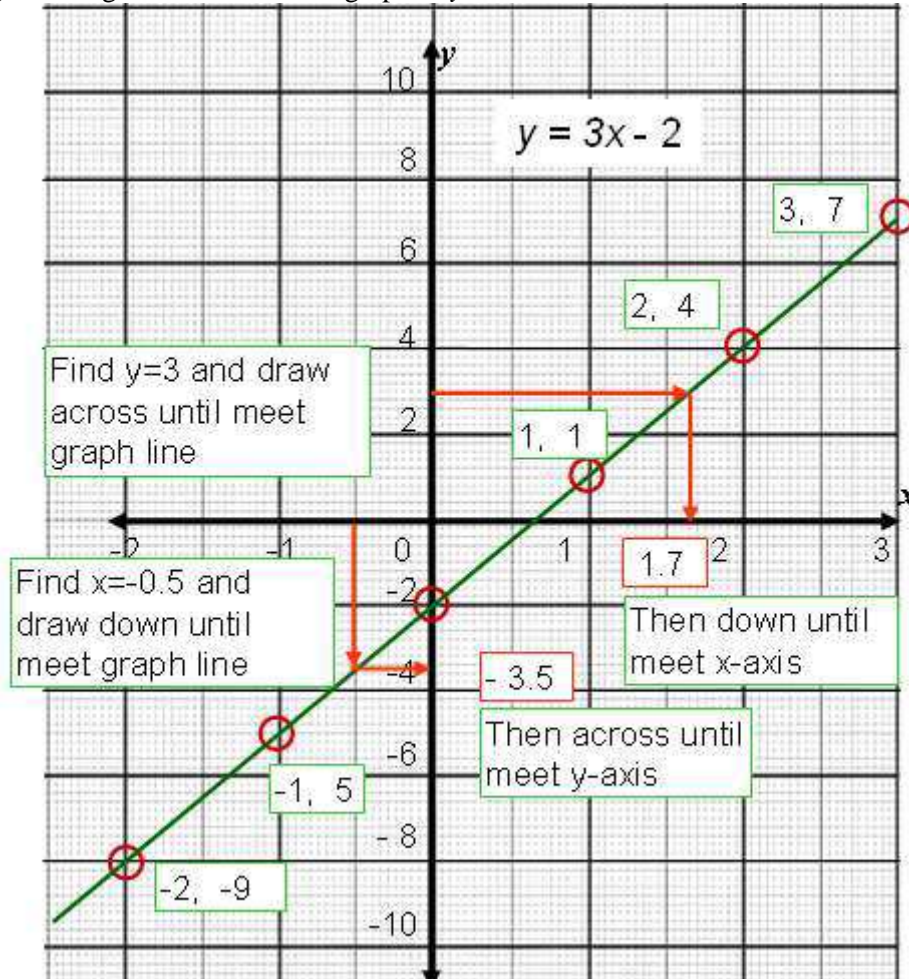
(2)

.....°

8. a) Complete the table of values for $y = 3x - 2$

x	-2	-1	0	1	2	3
y	-9	-5	-2	1	4	7

- b) On the grid below draw the graph of $y = 3x - 2$



- c) What is the value of the gradient of this graph

3

(2)

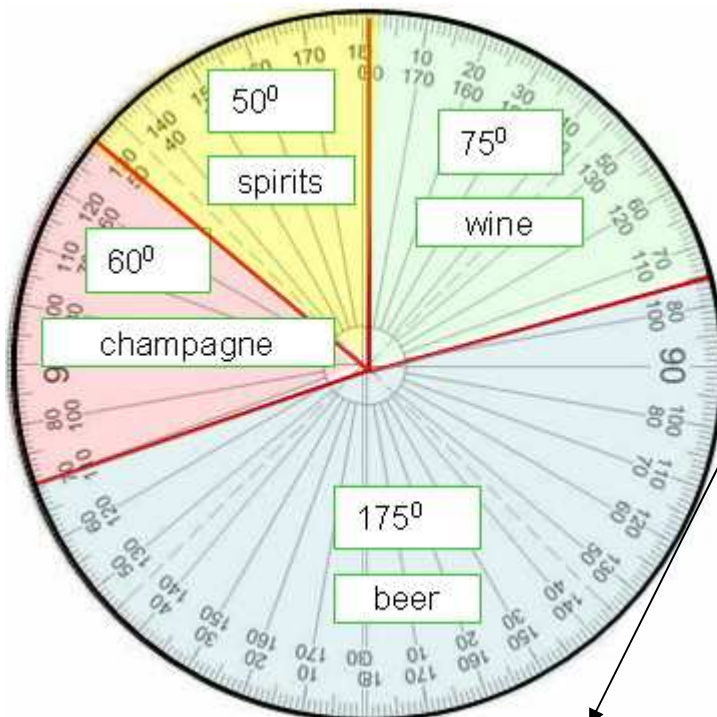
(2)

(1)

9. Maurice recorded the types of beverages that 72 of his customers bought in his off-license for Christmas

Beverage	Frequency
Wine	15
Beer	35
Spirits	10
Champagne	12

Draw an accurate pie chart to show this information



3 6 0 ÷ 7 2 x 1 5 =

A circle has 360°
This probably comes from the fact that it takes about 360 days for the Earth to go around the Sun!

Work out how many degrees each customer would be on the circle

Degrees per customer is:
 $360 \div \text{number customers}$
 $= 360^\circ \div 72 = 5^\circ$

Now use frequency to work out how many degrees for each beverage

Degrees for Wine is:
 $\text{Freq wine} \times 5^\circ$
 $= 15 \times 5^\circ = 75^\circ$

Degrees for Beer is:
 $\text{Freq beer} \times 5^\circ$
 $= 35 \times 5^\circ = 175^\circ$

Degrees for Spirits is:
 $\text{Freq spirits} \times 5^\circ$
 $= 10 \times 5^\circ = 50^\circ$

Degrees for Champagne is:
 $\text{Freq champagne} \times 5^\circ$
 $= 12 \times 5^\circ = 60^\circ$

Check that these all add up to 360°
 $75^\circ + 175^\circ + 50^\circ + 60^\circ = 360^\circ$

(4)

10. Aunty Alice left £320 in her will to share between Harry, Luke and Phina

They share the money in the ratio 1: 2 : 5

a) How much do they each get

Harry.....	40
Luke.....	80
Phina.....	200

(2)

Uncle Jack left some money in his will to share between Bill and Ben in the ratio 2:3
Bill got £120.

b) How much did Ben get

.....	180
-------	-----	-------

(2)

11. Laura counted the number of sweets in each of 31 bags of sweets.

She put her results in a stem and leaf diagram.

0		8	8	9				
1		1	2	3	4	4	8	9
2		0	3	5	5	6	6	8
3		2	2	3	3	6	6	8
4		1	2	3	3	8	8	8

Key 4 | 1 stands for 41 sweets

There are 7 bags with more than 38 sweets. So percentage is $7/31$

22.6%

(2)

b) Write down the mode.

The number which happens most often.

48

(1)

c) Work out the range.

$$48 - 8 = 40$$

40

(1)

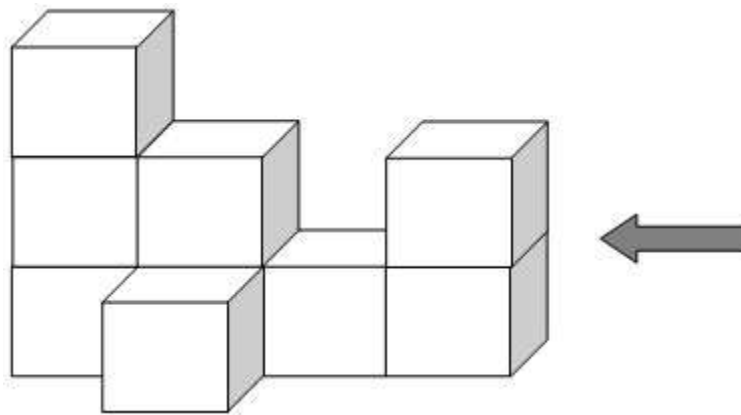
d) Work out the median.

MEDIAN is the middle value
15 numbers median 15 numbers
Its the 16th starting from 08

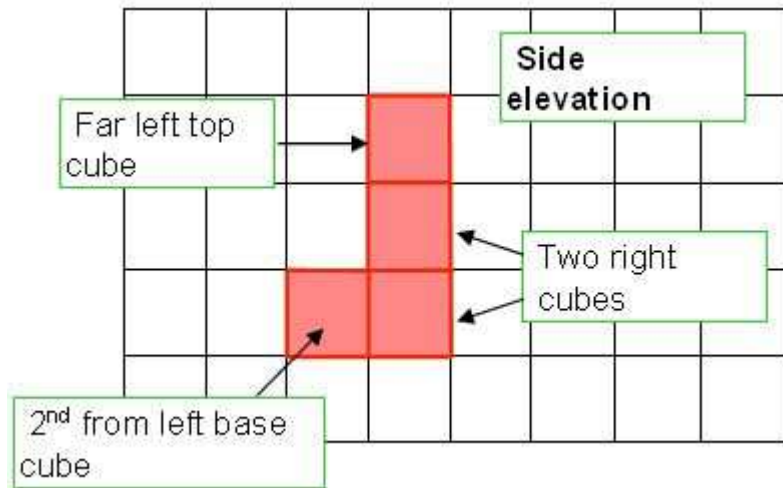
26

(1)

12. The diagram shows some identical cubes arranged to make a solid object.

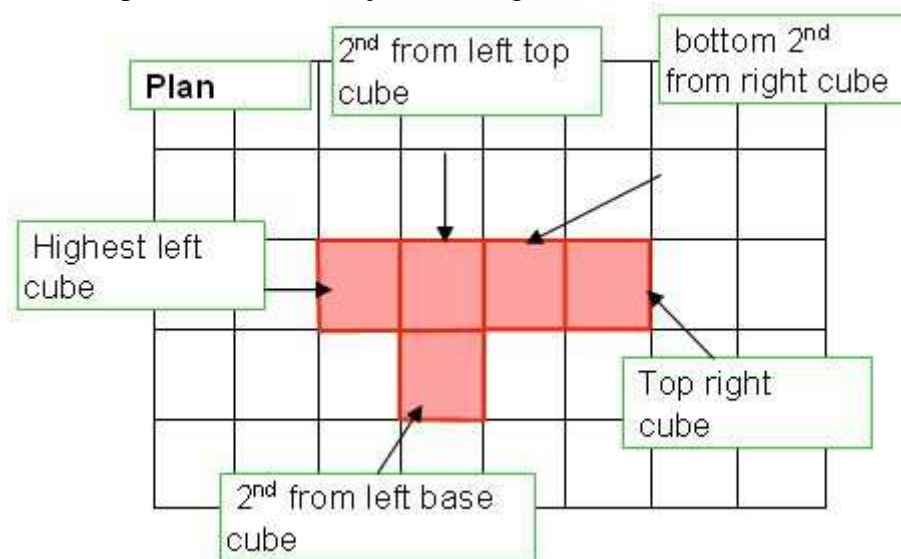


a) On the grid shown below draw the side elevation of the solid object as seen from the direction of the arrow.



(2)

b) Draw a plan of the solid object on the grid below.



(2)

13. Jane carried out a survey of her friends' favourite colours as below:

Pink	Green	Red	Blue
Green	Yellow	Pink	Pink
Green	Pink	Red	Pink
Yellow	Red	Pink	Green
Red	Pink	Blue	Pink

a) Complete the table to show Jane's results.

Colours	Tally	Frequency
Pink		
Red		
Green		
Yellow		
Blue		

b) How many of Jane's friends liked blue.

2

c) Which was the favourite colour of Jane's friends?

Pink

14. Matthew thinks of a number.

He multiplies this number by 11, then subtracts 63

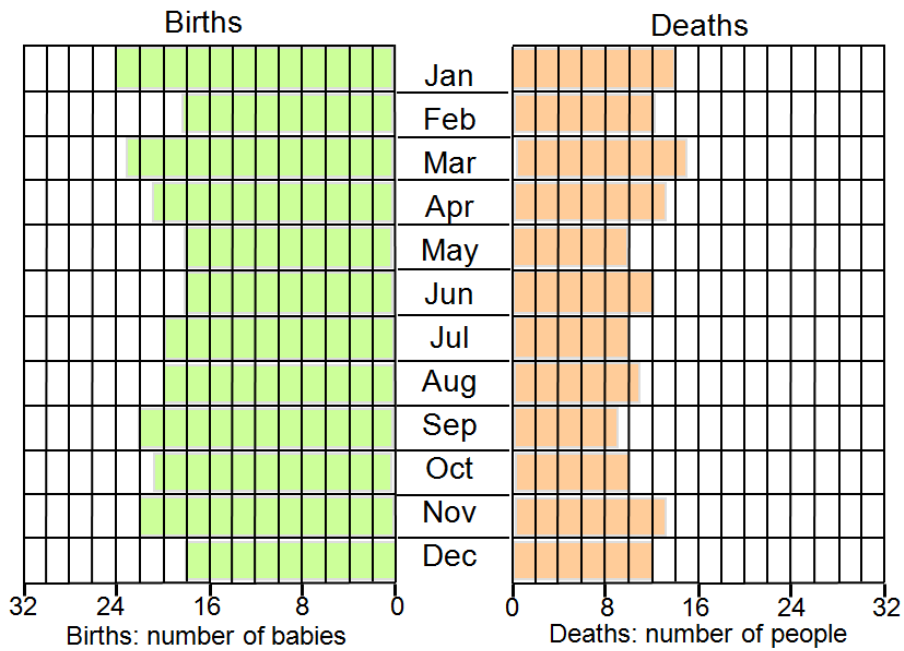
The result is twice the number that he was thinking of.

Use algebra to find the number Matthew was thinking of.

$$\begin{aligned} \text{Solve } 11n - 63 &= 2n \\ n &= 9 \end{aligned}$$

15. Some information was collected about births and deaths in a town

The diagram shows how many people died and how many babies were born.



(a) In which month did the greatest number of people die

Look for the **longest** bar on the **right deaths** scale

March ✓

(1)

(b) How many babies were born in **September**.

Read the length of the bar on the **left birth scale** for September

22 ✓

(1)

(c) In **November**, more babies were born than people died.
How many more?

December there were 22 births and 13 deaths
Difference = Births – deaths
= 22 – 13 = 9

9 ✓

(1)

16.



Pythagoras theorem required because we have right angle triangle with two sides given

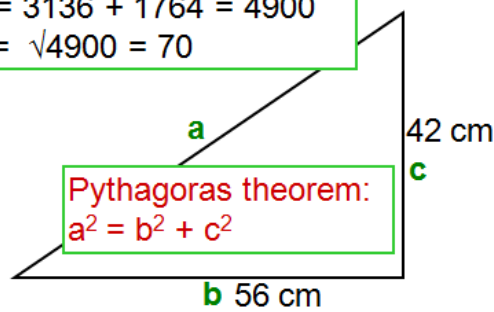
Luke wanted a TV with a diagonal screen of 72cm.

Harry thought that a TV with a screen of height 42 cm and width 56 cm would be OK.

Is Harry correct?

Show all your working.

Pythagoras theorem:
 $a^2 = 56^2 + 42^2$
 $a^2 = 3136 + 1764 = 4900$
 $a = \sqrt{4900} = 70$



Pythagoras theorem:
 $a^2 = b^2 + c^2$

5 6 x² + 4 2 x² = √ =

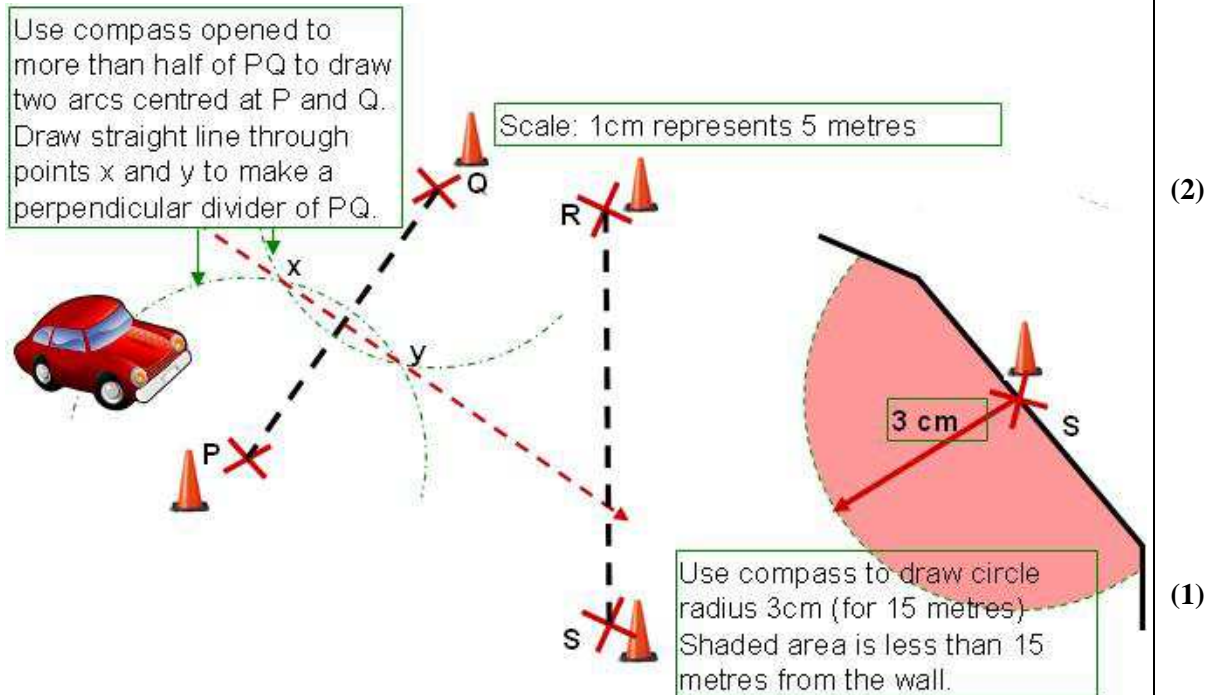
Use x² button to square

No the screen is only 70cm diagonally

(3)

17. In a driving competition cars had to be driven so that:
 The car travelled in a straight line between PQ and RS
 The car had to always be the same distance from P and Q.

On the diagram, draw the route that the car should take.



As part of the competition drivers have to park their car within 15 metres of a mark S on a wall.

- b) Using the scale of 1cm represents 5 metre shade this parking area.

18. The table below provides information about the time taken for 100 teachers to complete a numeracy test.

Take mid-value from each class interval

Use this column to work out time as mid value x freq

12.5

17.5

22.5

27.5

32.5

Time (tes)	Frequency	
$10 < t \leq 15$	8	$8 \times 12.5 = 100$
$15 < t \leq 20$	18	$18 \times 17.5 = 315$
$20 < t \leq 25$	25	$25 \times 22.5 = 562.5$
$25 < t \leq 30$	44	$44 \times 27.5 = 1210$
$30 < t \leq 35$	5	$5 \times 32.5 = 162.5$

2350

Add up the total time

a) Write down the median class interval

$20 < t \leq 25$

(1)

b) Calculate an estimate for the mean time taken by the teachers.

MEAN = $\frac{\text{Total Time taken to complete test}}{\text{Number of takers}}$

DON'T add up the class intervals and divide by the total frequency (100)

For each class interval we estimate the time taken
Use the mid value from each class x frequency

Mean = $\frac{2350}{100} = 23.5$ minutes

23.5 ...minutes

(4)

19. Lewis Hamilton drove 350 miles around a racing circuit in 2 hours 30 minutes.

Calculate his average speed in miles per hour.

Using the formula triangle.
S is speed, D is distance
and T is time.



Convert 2 hours 30 minutes = 2.5 hours

Cover speed in triangle to
get formula $s = d \div t$

$$s = 350 \div 2.5 = 140$$

140

.....mph

3 5 0 ÷ 2 . 5 =

(2)

20. The mass of 4 m^3 of copper is 35840 kg.

a) Work out the density of copper.

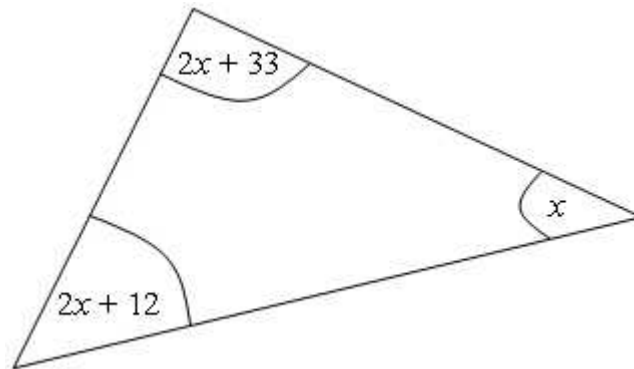
..... 8960 kg/m^3 (2)

The density of zinc is 7130 kg/m^3 .

b) Work out the mass of 4 m^3 of zinc.

..... 28520kg (2)

21.



Not drawn accurately

The angles shown in the triangle above are:

$$2x + 33;$$

$$x$$

$$2x + 12$$

a) Write down an equation in terms of x using this information

$$5x + 45$$

(2)

b) Using your answer above work out the value of x

$$\text{In } \Delta \text{ all angles} = 180 \text{ so } 5x + 45 = 180$$

$$\text{Subtract 45 from both sides, then } \div 5 : 5x = 135 \rightarrow x = 27$$

$$27$$

$$x = \dots\dots\dots$$

(2)

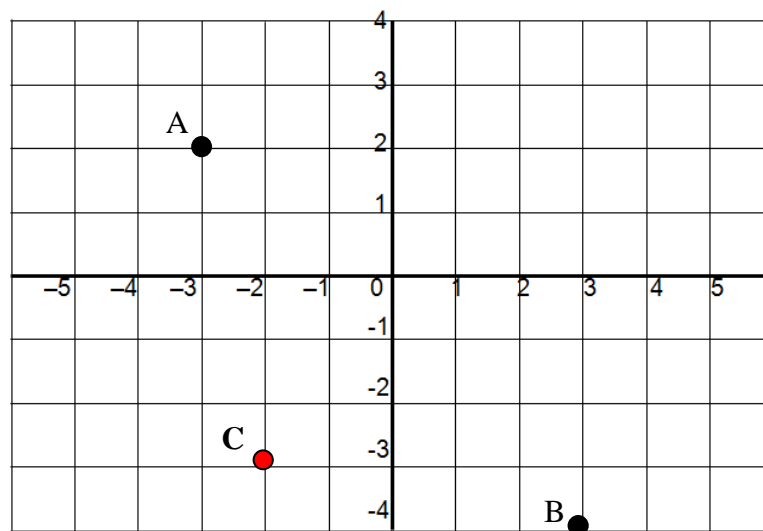
22. Laura is buying stationary for school.
She needs pens and small whiteboards

The pens are sold in packs of 12 pens per pack.
The small whiteboards come in boxes with 16 small whiteboards each.
Laura buys exactly the same number of pens as whiteboards.

What is the least number of packs and boxes Laura needs to buy?

.....boxes
3
packs
4 (3)

23. Look at the graph



a) What are the co-ordinates of point A and B

-3, 2
 A (1)

B (1)

3, -4

b) Mark point C at $(-2, -3)$ on the graph

(1)

24.

a) Simplify

$$y - 3 + 2y - 3$$

$$3y - 6$$

(1)

a) Simplify

$$5 \times y \times 3 \times y$$

$$15y^2$$

(1)

c) Solve

$$y - 3 = 16$$

$$19$$

(1)

d) Ryan thought that this equation is impossible.
Is he right or can you get an answer for y

$$4y + 3 = 3 - 4y$$

$$\text{yes, } 0$$

(2)

e) Make x the subject of the formula

$$y - 3 = 2x + 4$$

$$(y - 7)/2$$

(2)

f) Solve the inequality $3x - 2 < 13$

$$x < 5$$

(2)

25.

Shop A sold potatoes at £5 for 6kg
Shop B sold potatoes at £4.25 for 5kg

Which shop was the cheapest?

83.3p v 85p
shop A

(3)

26.

Express 54 as a product of its prime factors by drawing a prime factor tree

Write your answer in index form

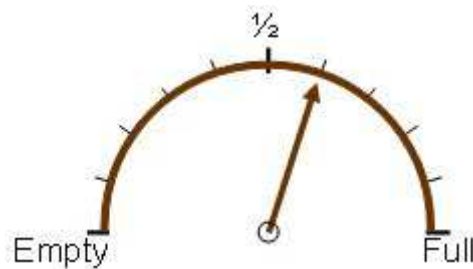
$$2 \times 2 \times 2 \times 7 \\ = 2^3 \times 7$$

(3)

27.

The fuel tanks of a space rocket could hold 4500000 litres of fuel.

Tim Peake looked at the fuel dial soon after launch.
How much fuel was left in the fuel tank?



$$5/8^{\text{th}} \text{ of } 4500000 = 2500000$$

(2)