

First Name	
Last Name	
Date	
Total Marks	/ 100 marks



GCSE Mathematics
Calculator
Higher Tier
Free Practice Set 5
1 hour 45 minutes



Answers at:

<http://www.mathsmadeeasy.co.uk/gcsemathspapers-free.htm>

Instructions

Write your name and other details in the boxes above.
Answer all the questions
Take π to be 3.142

Information

Marks are shown in brackets for each question (2)
Calculators may be used

Advice

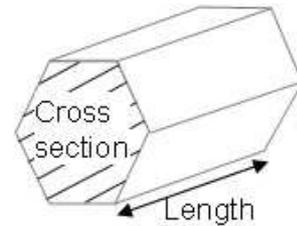
Don't spend too long on one question
Show all your working in calculations for full marks
You will get marks for method even if your answer is incorrect
Leave a question until later if you cannot answer it

Materials needed for examination

Ruler marked in centimetres and millimetres,
protractor, compasses, pen, pencil, rubber
Tracing paper may be used

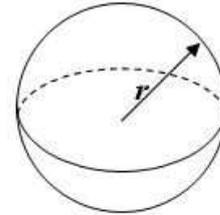
Formulae sheet — Higher tier

Volume of prism = area of cross-section \times length



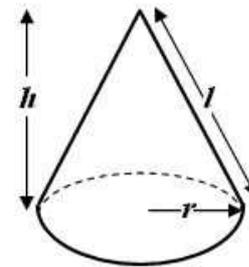
Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$

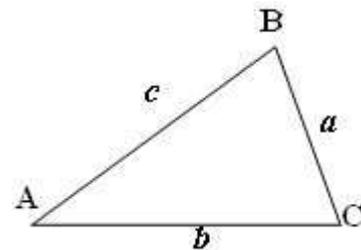


In any triangle ABC

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of a triangle = $\frac{1}{2} ab \sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

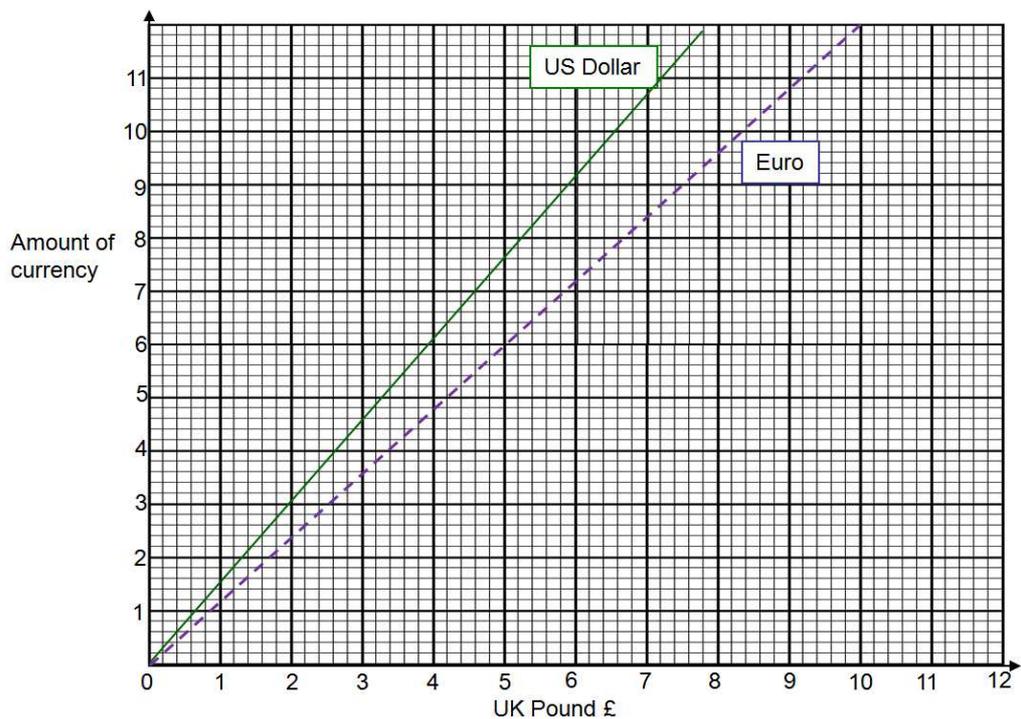
Authors Note

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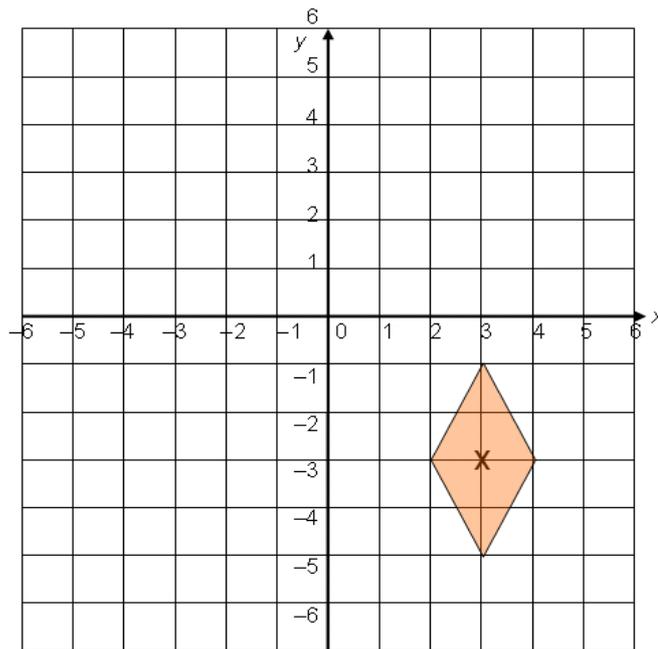
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1. The conversion graph is used to change between UK pounds (£) and two different currencies – the Euro (€) the US dollar(\$)



- a) Use the graph to change 7 UK pounds into Euros (€) €..... (1)
- b) What is 10 US dollars (\$) in UK pounds (£) £..... (1)
- c) What is 5 Euros (€) in US Dollars (\$) \$..... (1)

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



(2)

3. The table below shows the number of students in each class who are having one to one maths tuition.

Class	Number of students	Number of students having 1 to 1 maths tuition
S	26	4
T	27	6
U	28	3
V	30	4
W	31	5
X	29	3
Y	29	2
Z	26	4

What percentage of the students in the school is having one to one maths tuition.
Give your answer to the nearest whole number.

.....

(3)

4. A plan of a bedroom is shown.

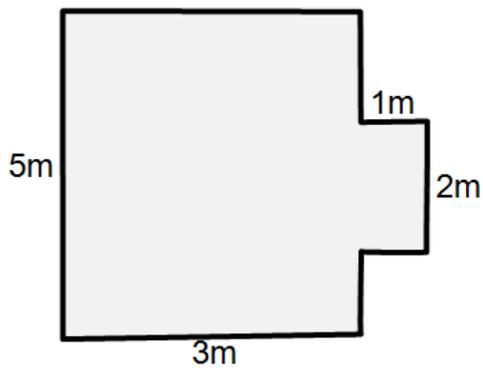


Diagram not
drawn accurately

Carpet comes in a 4 metre roll and costs £15 per square metre.
Underlay goes under the carpet and comes in 1 metre squares.
Underlay costs £6 per square metre.

Gripper rod which go around the perimeter of the room hold the carpet in place
Gripper rods cost 50 pence per metre.

The carpet fitter charges £50 to fit the carpet.

Work out the total cost of fitting a carpet

..... (6)

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

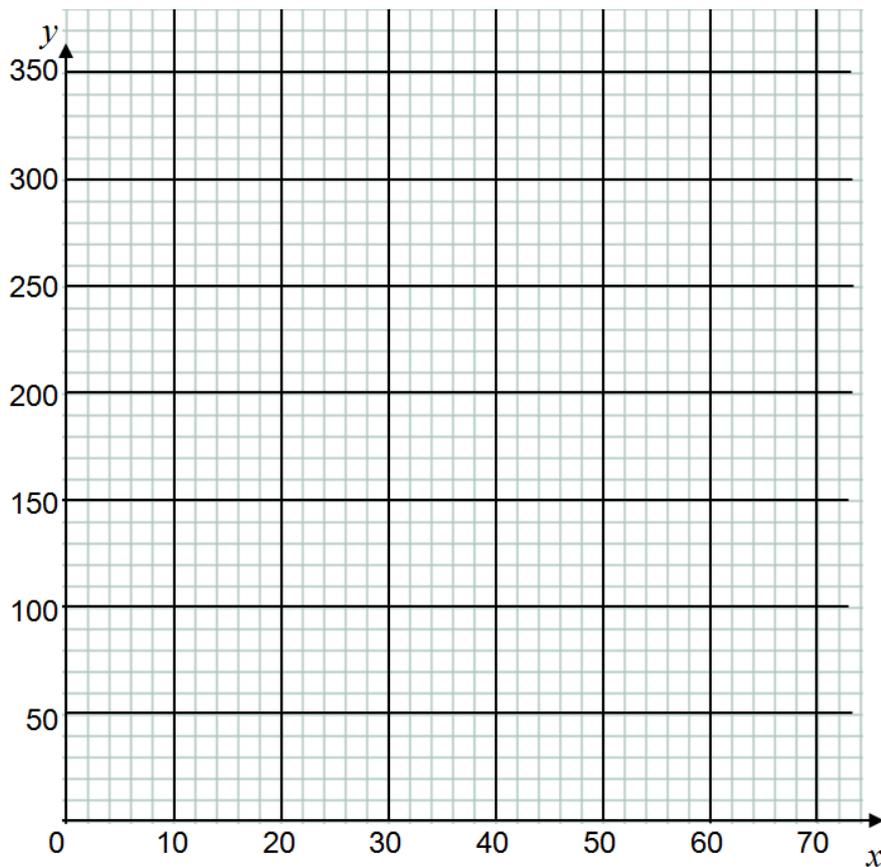
$$y = x \left(\frac{x}{20} + 1 \right)$$

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

(1)

- b) Plot the co-ordinates and draw the graph on the grid below.

(2)



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

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

x is the speed in mph.

- b) Estimate the speed of a car with a stopping distance of 60 feet

..... mph

(2)

6. In 2012, the United Kingdom hosted the Olympic Games in London. 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.

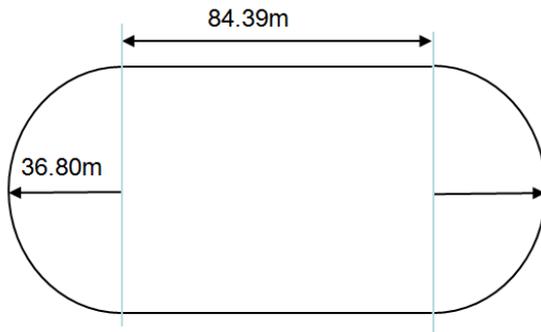
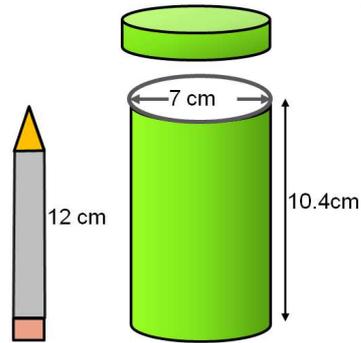


Diagram not
drawn accurately

Show that the perimeter is 400m.

(3)

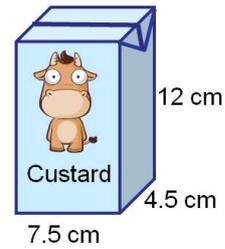
7. Sylvia had a pencil-case in the shape of a cylinder with the dimensions shown. The pencil case had a tight top that fitted snugly. She wanted to put a 12 cm pencil in her pencil-case.



- 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

(3)

8. 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.

..... cm³ (2)

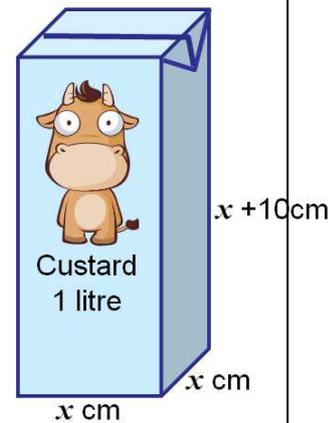
The custard company wants to design a new larger carton to hold 1000cm³ of custard.

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

The volume of a carton is given by

$$V = x^3 + 10x^2 \text{ where } x \text{ is the base width}$$

- b) Using trial and improvement work out x for a volume V of 1000cm³
Give your answer to one decimal place.
You must show **all** your working.



$x =$ cm (4)

9. 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) Convert 90°C to °F

..... °F (2)

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

..... °C (2)

10. A party of teachers travelled by car from Toddington to Ripon to attend a conference.

They drove 288 **km** at an average speed of 60 **mph**.

They stopped on route for a *25 minute break*.

They needed to be at the conference *10 minutes before* it started at 12:00

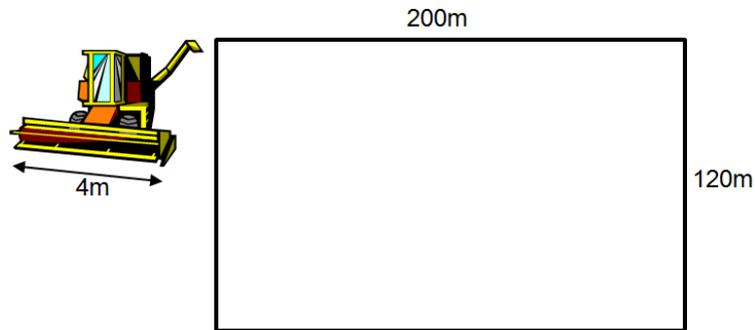
Using 5 miles = 8 kilometres, what is the latest time they must leave Toddington.
Give your answer in terms of the 24 hour clock.

..... (3)

11. 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

..... 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

..... hr min (3)

12. The plan of a swimming pool is shown below. One dimension is missing.

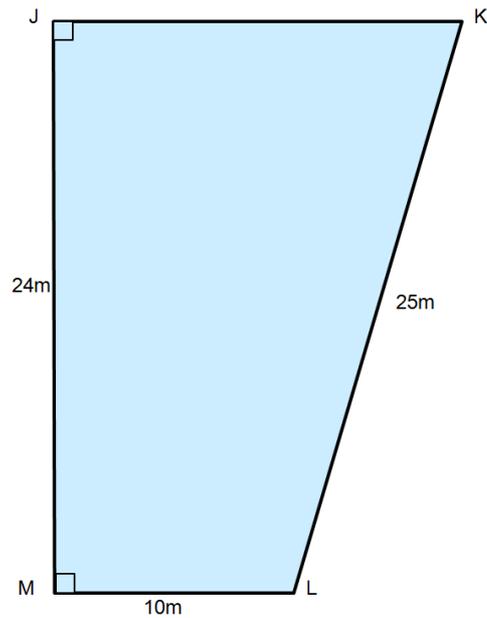


Diagram not drawn accurately

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

The area that is left over shows where children are allowed to swim.

Calculate the area where children are allowed to swim.
Give your answer to 3 significant figures

.....m² (8)

13. Eleanor wanted to work out how much the monthly repayments would be on her *fixed interest rate* mortgage.

She found a formula on the internet

$$M = \frac{P [i \times (1 + i)^n]}{[(1 + i)^n - 1]}$$

- M = The monthly payment
P = The amount of money being borrowed
n = The number of months of the mortgage
i = The interest per month and is calculated by converting the interest rate to a decimal and then dividing by 12.

- a) Calculate the monthly repayments on a mortgage of £100,000 at an interest rate of 4% over 25 years.
Give your answer to the nearest £

£ (5)

- b) Using your answer to a) work out the total amount paid over the 25 years.
Give your answer to the nearest thousand

£ (1)

14. In the Olympic Games the landing area for the discus event is a sector of a circle.

The length of the sector is 80m (L) and the two sector lines, at a distance of 80m, are spaced 48m apart. (W)

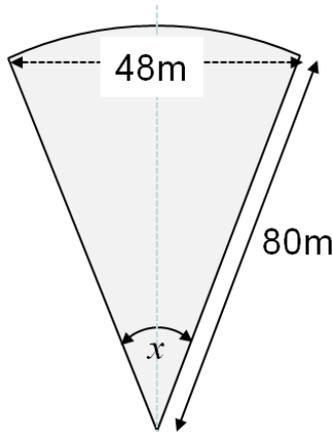


Diagram not drawn accurately

Discus landing area

a) What is the ratio of the width W to the length L
Give your answer in its simplest form.

..... (1)

b) Calculate the angle marked as x
Give your answer to 1 decimal place

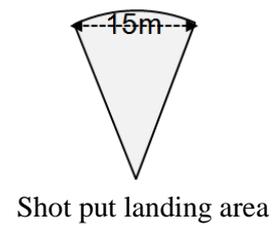
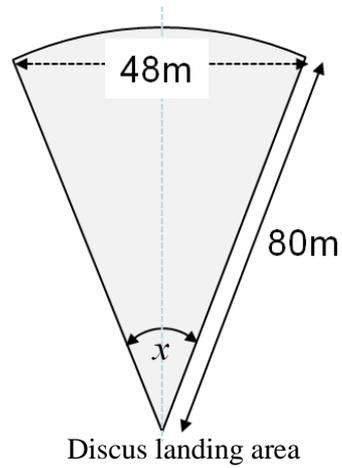
.....^o (3)

c) What is the area of the discus sector to 3 significant figures

..... m² (3)

- d) The shot put is a *similar* sector as the discus, but the two sector lines, are spaced 15m apart.

What is the area of the shot put sector to 3 significant figures



..... m² (3)

15. At a car boot sale, Laura bought some plates and cups.

At the car boot sale in Leicester she bought $2p$ plates and $3c$ cups.
In total she bought 66 items.

At the car boot sale in Nottingham she bought $3p$ plates and $2c$ cups.
In total she bought 69 items.

a) State this information as a pair of simultaneous equations.

(1)

b) Use your simultaneous equations to work out how many cup and plates she bought at Leicester.

Number of Plates (2)

Number of Cups

The price she paid for the cups was the same at both locations.
The price she paid for the plates was the same at both locations

For the 66 items at Leicester she paid £36.00
For the 69 items at Nottingham she paid £39.00

c) Work out how much she paid per cup and per plate.

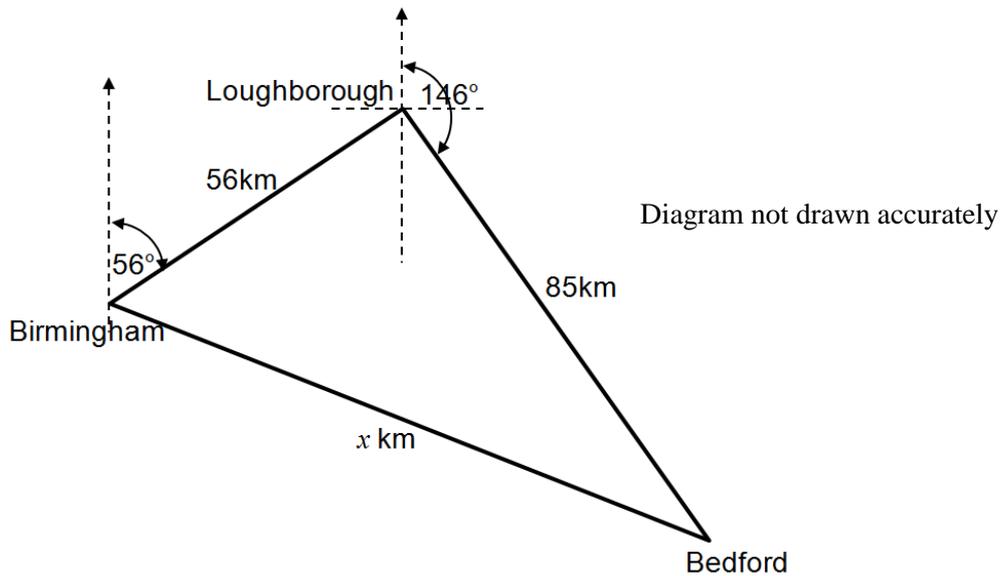
Each cup costs £.....

Each plate costs £.....

(2)

16. A helicopter flies from Birmingham on a bearing of 056° for 56 km to Loughborough.

It then flies 85 km on a bearing of 146° to Bedford.



- a) How far is Bedford from Birmingham?
Give your answer to the nearest kilometre.

..... km (3)

- b) What is the bearing of Birmingham from Bedford.
Give your answer to the nearest degree.

..... $^\circ$ (2)

17. ABCD is a cyclic quadrilateral.
 Angle AOB is 104° , DCB is 95°
 O is the centre of the circle.

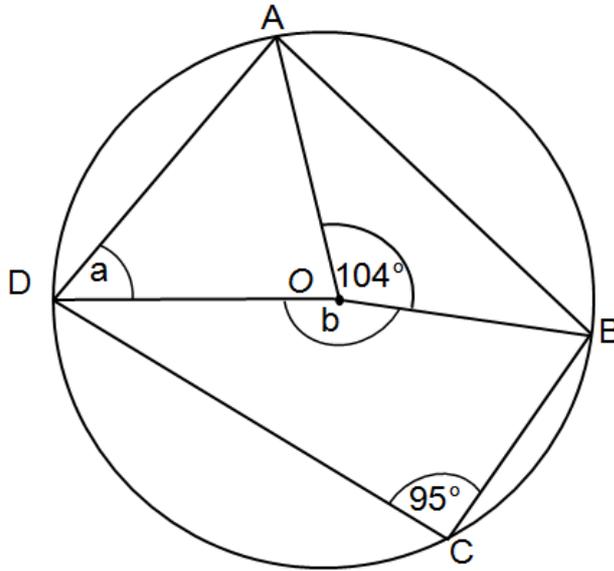


Diagram not accurately drawn

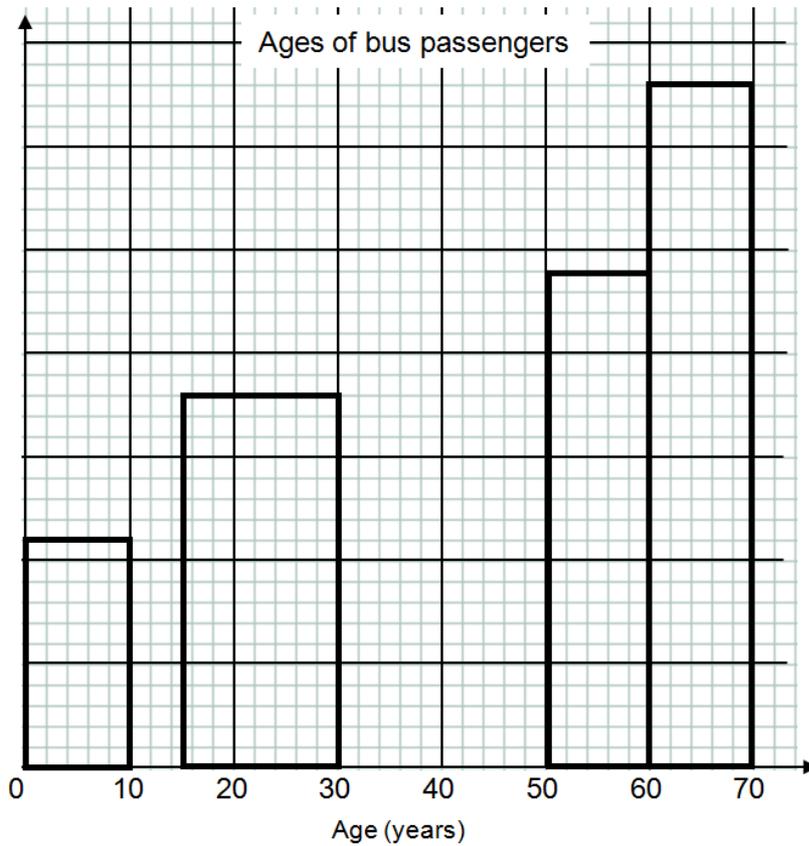
- a) Work out the size of the angle DOB marked 'b'
 Give a reason for your answer

..... $^\circ$ (2)

- b) Work out the size of the angle ADO, marked 'a'
 Give a reason for your answer

..... $^\circ$ (2)

18. The table and histogram show information about the age of passengers on a bus.



- a) Use the histogram to complete the table

Time (t years)	Frequency
$0 < t \leq 10$	11
$10 < t \leq 15$	16
$15 < t \leq 30$	
$30 < t \leq 50$	24
$50 < t \leq 60$	
$60 < t \leq 70$	33

(2)

- b) Use the table to complete the histogram

(2)

19. Sylvia runs 100 metres in a time of 25.6 seconds

The distance of 100 metres was measured to the nearest metre.
The time of 25.6 seconds was measured to the nearest tenth of a second.

a) What is the **upper** bound for the distance of 100 metres

..... m (1)

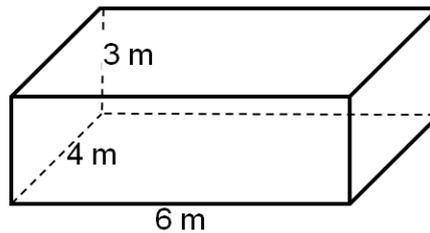
b) What is the **lower** bound for the time of 25.6 seconds

.....s (1)

c) Calculate the **lower** bound for Sylvia's average speed
Show all the figures on your calculator display

.....m/s (2)

20. The floor of a room is 6 m by 4 m, and its height is 3 m.



a) Find the distance from a corner point on the floor to the opposite corner point on the ceiling. Give your answer correct to 1 decimal place

..... (4)

21. A six sided shape is shown below with all the corners as right angles. Measurements are in centimetres.

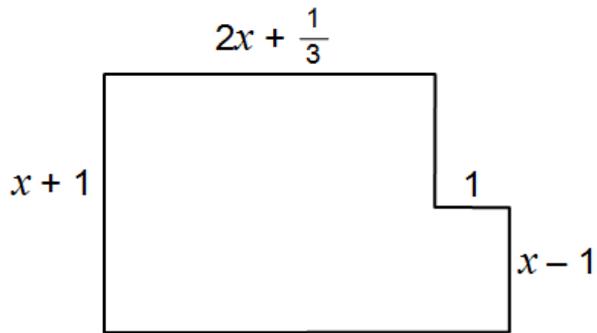


Diagram not accurately drawn

The area of the shape is 18 cm^2

- a) Show that $3x^2 + 5x - 28 = 0$

(4)

- b) Find the height of the shape

Height iscm (3)