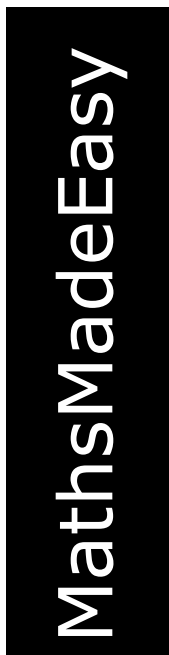


First Name	
Last Name	
Date	
Total Marks	/ 100 marks



GCSE Mathematics
Non-Calculator
Higher Tier
Free Practice Set 4
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 not 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

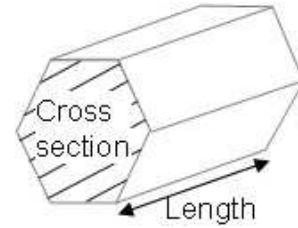
Leave a question until later if you cannot answer it

Materials needed for examination

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

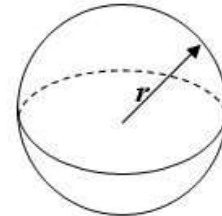
Formulae sheet — Higher tier

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



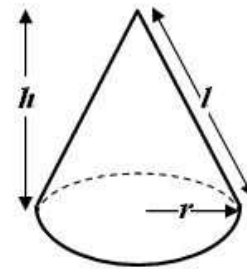
Volume of sphere = $\frac{4}{3} \pi r^3$

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



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

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

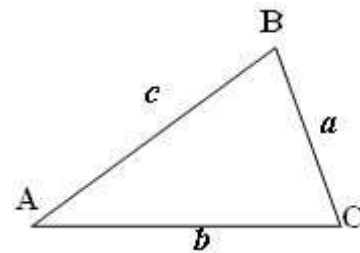


In any triangle ABC

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

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

Apart from any fair dealing for the purposes of research or private study as permitted under the Copyright, Designs and Patents Act 1988, this paper may only be reproduced, stored or transmitted in any form or by any means with the prior permission in writing of the author, or in the case of reprographic reproduction in accordance with the terms and licence by the CLA. Enquiries concerning reproduction outside these terms should be sent to the author.

The right of David Weeks to be identified as the author of this work has been asserted by him in accordance with the Copyright, Designs and Patents Act 1988.

1. Work out

$$7.69 \times 53$$

..... (2)

2. a) Draw a prime factor tree for 231 and 315

(2)

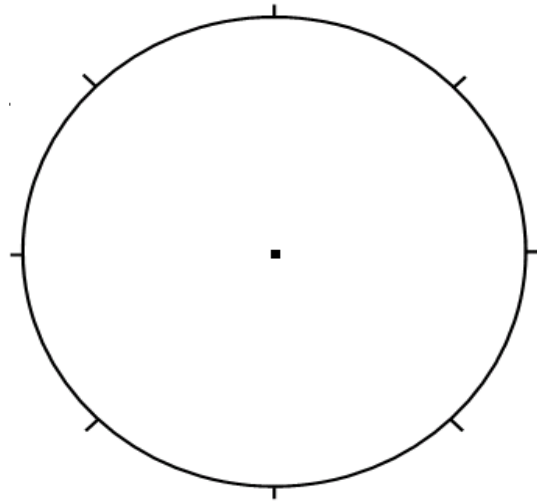
b) Using your prime factor tree or otherwise work out the Highest Common Factor for 231 and 315

..... (1)

3. In 2005, a woman earned **£240** each week.

The table shows how she spent her money.

Rent	£120
Food	£60
Clothes	£30
Going out	£30



- a) Complete the pie chart above to show how the woman spent her money.

(2)

Remember to **label** each sector of the pie chart.

4. a) Cyril starts with 3 white and 2 black counters in a bag

He adds some more white counters in the bag.
He takes out one counter without looking.

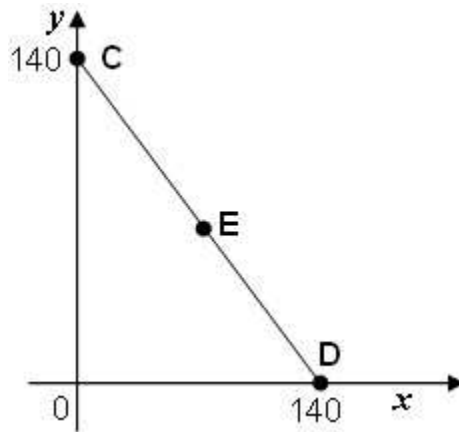
The **probability** that the counter will be **black** is $\frac{1}{4}$

How many more white counters did Cyril add to the bag?

.....

(2)

5.

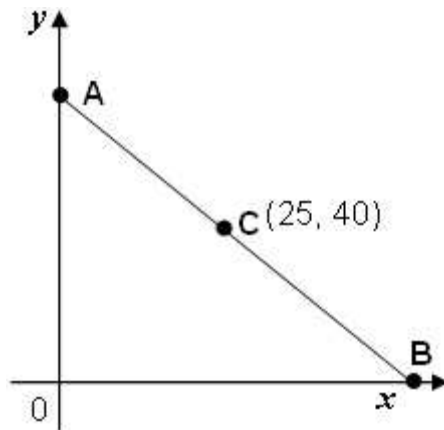


- (a) E is the midpoint of line CD.

What are the coordinates of point E?

E is (.....,) (1)

- (b) C is the midpoint of line AB.



The coordinates of C are (25, 40)

What are the coordinates of points A and B?

A is (.....,) (1)

B is (.....,) (1)

6. Outside a school, the speed of passing cars was recorded.

The speeds of 17 cars are shown below.

14 17 20 25 31 40 17 21 27
32 33 18 24 28 24 29 24

a) Draw an ordered stem and leaf diagram to show this information
Remember to include a key.



key

(3)

b) What is the median speed?

.....

(1)

7.

On the grid, draw the graphs of

$$x = -2$$

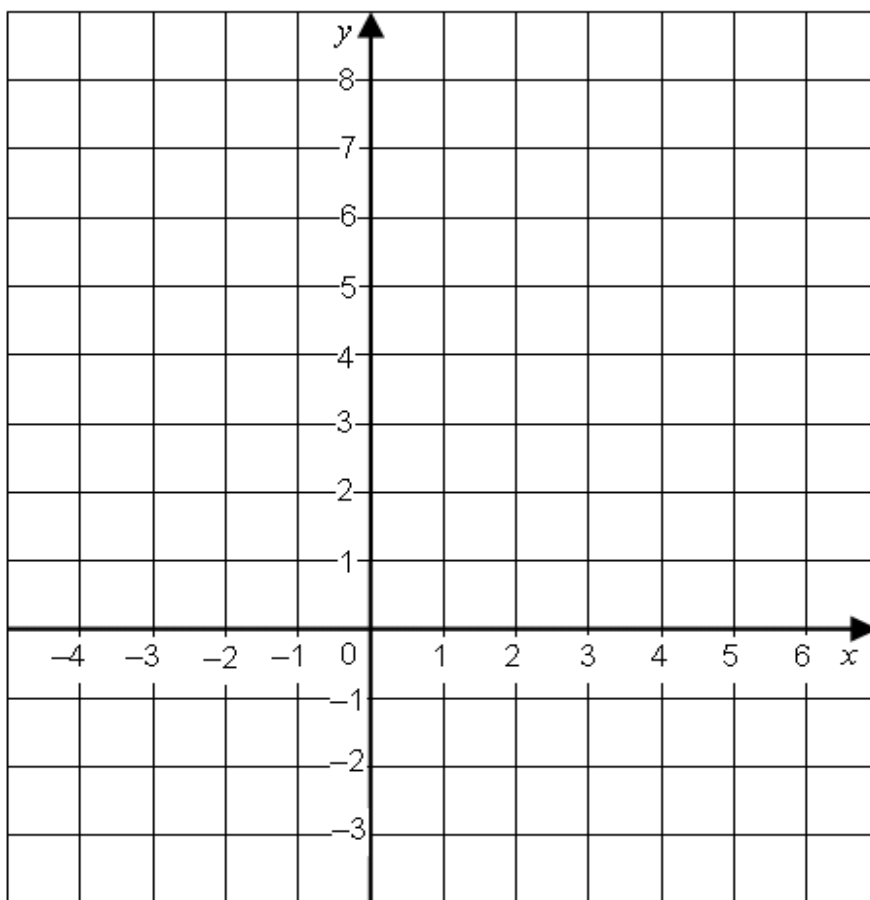
$$y = -1 \quad \text{and} \quad y = 3$$

$$y = x - 3 \quad \text{for } x \text{ from } 1 \text{ to } 6$$

(1)

(1)

(3)



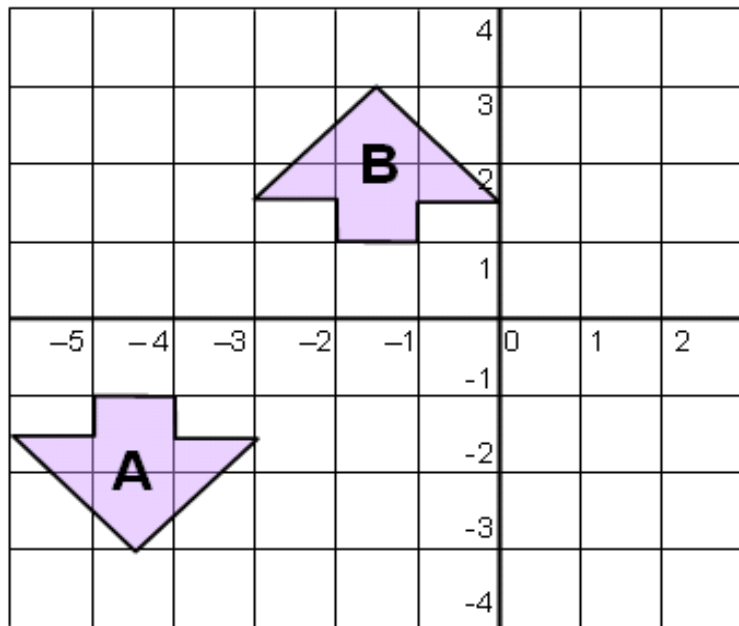
b) What is the name of the shape enclosed by the four lines?

..... (1)

c) What is the area of this shape

..... (1)

8. a) Fully describe the single transformation which takes shape A to shape B



.....

.....

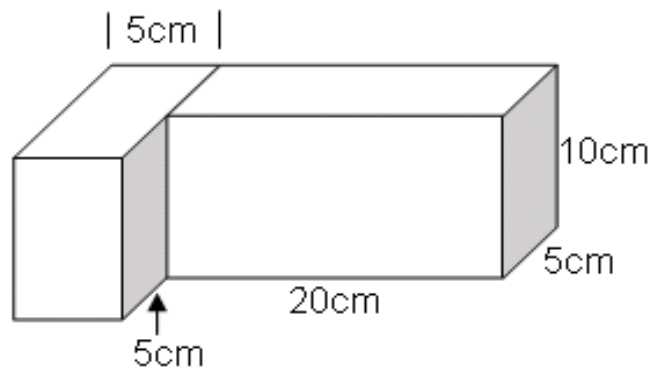
(3)

9. Estimate the value of $\frac{15 \times 9.8}{1.49 - 0.99}$

.....

(2)

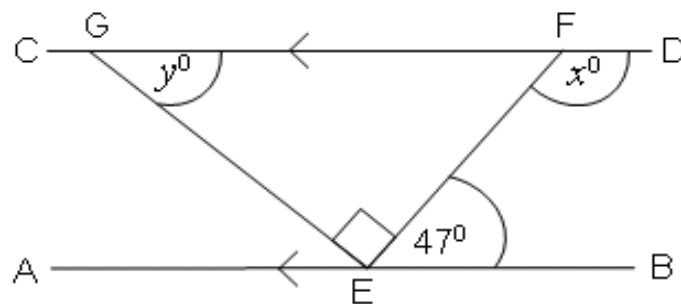
10. Gaynor put two blocks together as shown



What is the volume of the two blocks

.....cm³ (2)

11. The diagram shows two parallel lines AB and CD and a triangle EFG.

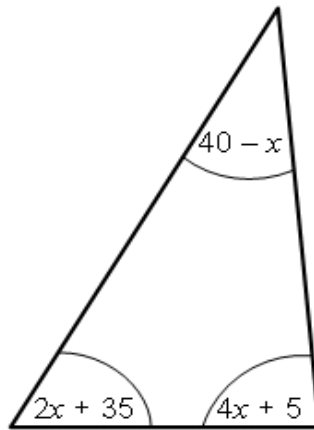


Work out the sizes of angles x and y

$x = \dots\dots\dots^\circ$ (1)

$y = \dots\dots\dots^\circ$ (1)

12. Three angles are shown in the triangle below.



a) Write an equation for the sum of the total angles in the triangle in terms of x .

.....

(2)

b) Solve the equation to find x

$x = \dots\dots\dots^\circ$ (2)

c) What is the size of the largest angle in the triangle.

largest angle = $\dots\dots\dots^\circ$ (1)

13. a) Work out $1\frac{4}{7} + 2\frac{2}{3}$

Give your answer as a fraction in its simplest form.

..... (2)

b) Work out $2\frac{5}{8} \div 5\frac{2}{5}$

Give your answer as a fraction in its simplest form.

..... (2)

14. Using a compass and ruler construct an angle of 45°

Use the right angle shown to help you.

Show all your construction lines



(2)

15. a) Simplify $a \times a \times a \times a \times a$ (1)
.....
- b) Expand and simplify $4(x + 2y) + 3(4x - y)$ (2)
.....
- c) Factorise $6y - 12$ (1)
.....
- d) Factorise $y^2 - 5y$ (1)
.....
- e) Expand and simplify $(2x - 3)^2$ (2)
.....
- f) Solve $5x - 10 = 18 - 3x$ (2)
.....
- g) Solve $x^2 + 13x - 14 = 0$ (3)
.....

16. Whilst in Switzerland Matthew bought a snowboard in a sale.

**Sale
Snowboards
15% off**

The **sale price** was 510 Swiss Francs (CHF).

Work out the **normal price** for the snowboard.



CHF..... (3)

17. a) Write as a power of 7

i) $7^{10} \times 7^5$ (1)

ii) $\frac{7^3 \times 7^5}{7^2}$ (2)

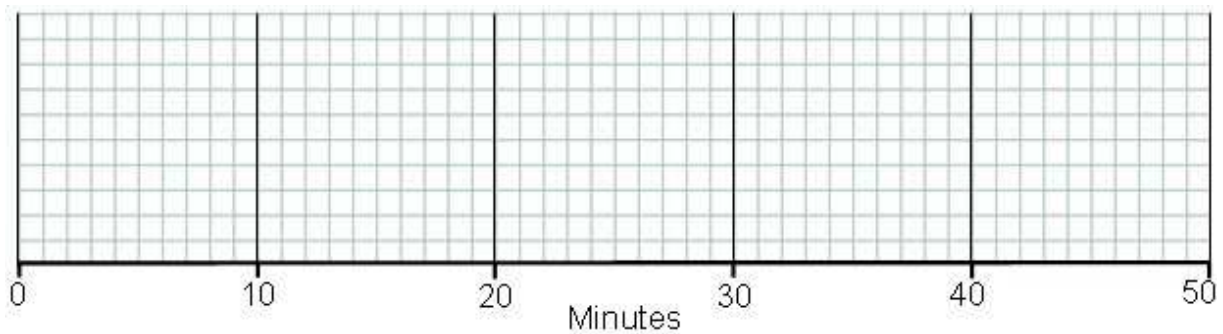
b) What is 2^{-2} as a decimal (1)

c) Write down the reciprocal of 5 (1)

18. Mrs Dew set her students some homework.
Each student recorded the time taken for them to do their homework.
Mrs Dew used this information to work out the following table.

	Minutes
Shortest time	13
Lower quartile	20
Median	27
Upper Quartile	36
Longest time	49

Draw a box plot for this information on the grid below



(3)

19. At the supermarket, Henry buys **three** ready meals and **two** drinks for **£18.10**
In the same supermarket, Gaynor buys **five** ready meals and **three** drinks for **£29.90**
What is the cost of the ready meal and the cost of the drink

Ready meal : £

Drink : £

(4)

20. A survey of 120 children was made to see how long they spent on Facebook each week.

The table below shows how long in hours the children spent.

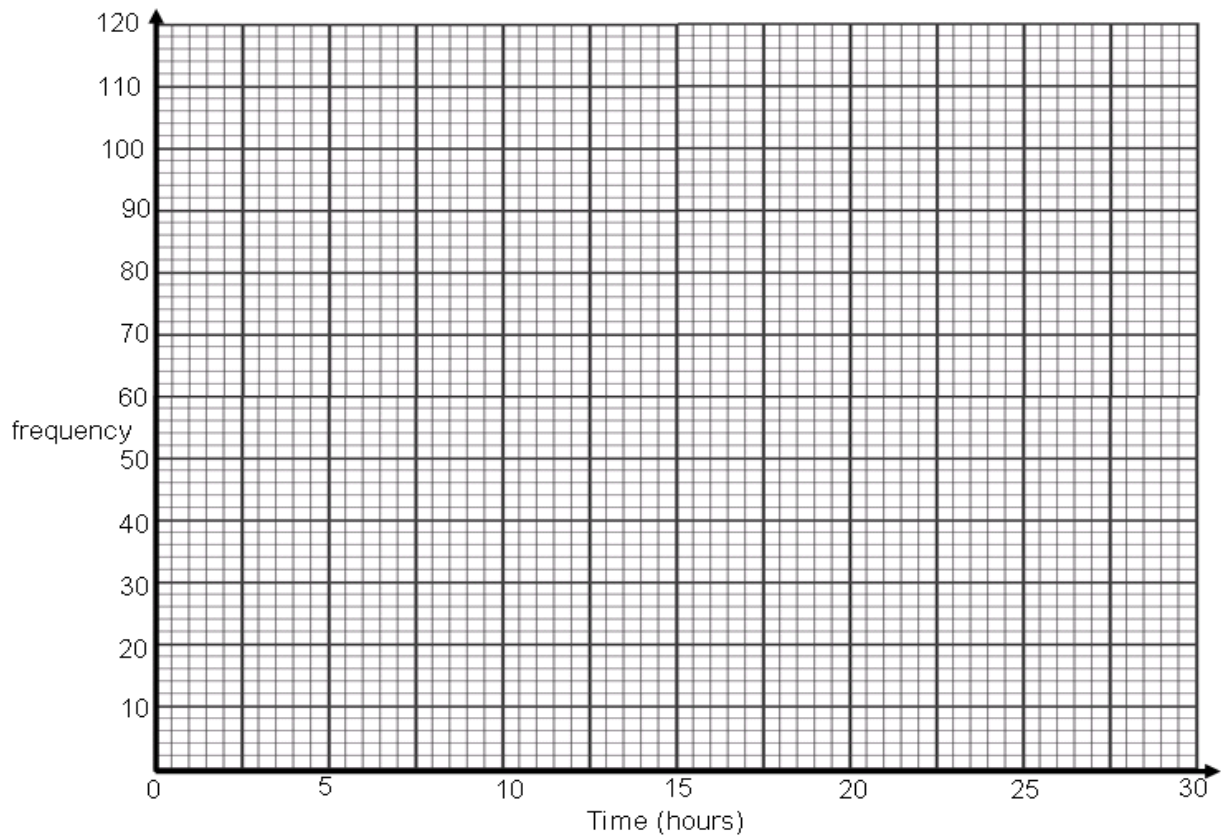
Time (t hours)	Frequency
$0 < t \leq 5$	4
$5 < t \leq 10$	22
$10 < t \leq 15$	37
$15 < t \leq 20$	34
$20 < t \leq 25$	16
$25 < t \leq 30$	7

- a) Complete the cumulative frequency table below

Time (t hours)	Frequency
$0 < t \leq 5$	4
$0 < t \leq 10$	
$0 < t \leq 15$	
$0 < t \leq 20$	
$0 < t \leq 25$	
$0 < t \leq 30$	

(1)

b) Use the table to plot the cumulative frequency graph below



(2)

c) Use your graph to estimate how many children spent longer than 17 hours on facebook per week.

.....

(1)

d) Estimate the median time that children spent on Facebook

.....

(1)

21. The gravitational force F (Newton) between two masses is inversely proportional to the square of the distance d between them.

When $d = 8$, $F = 10$

a) Find a formula for F in terms of d .

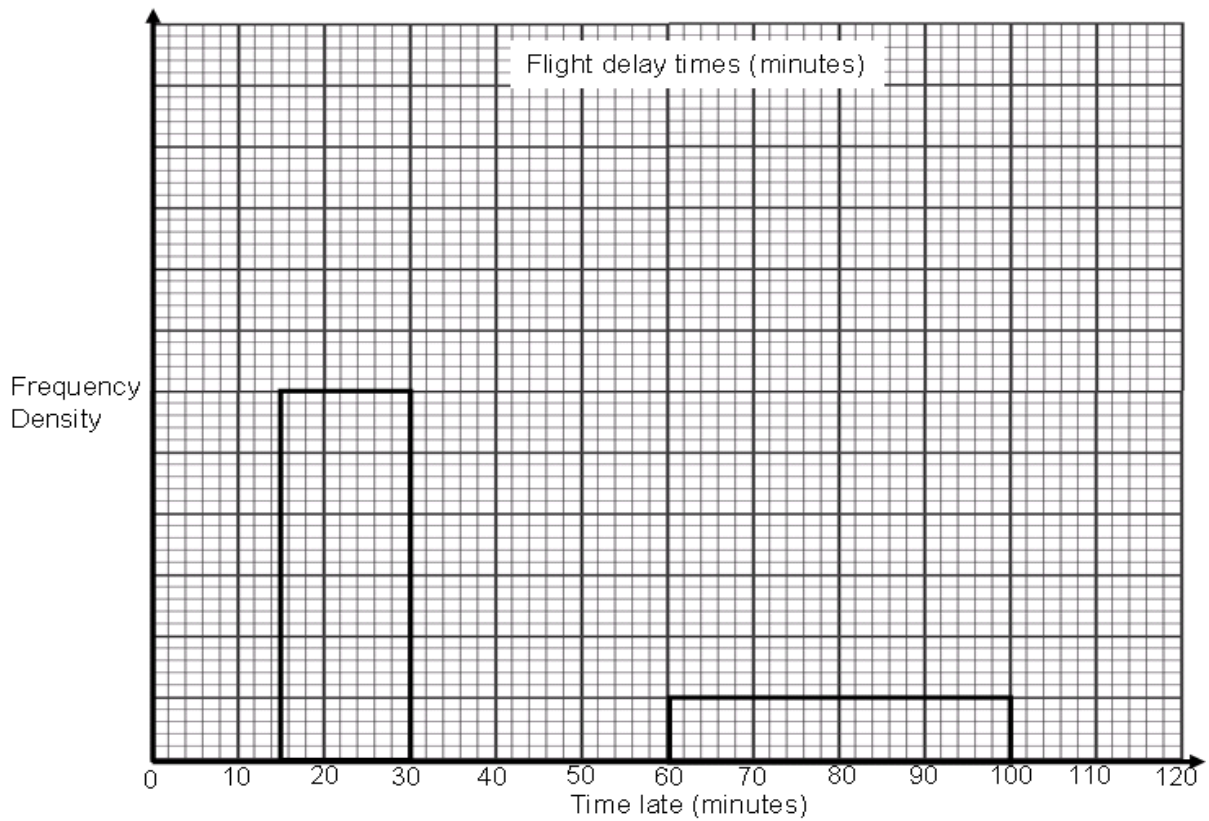
b) Hence or otherwise calculate F when $d = 10$

..... (3)

..... (1)

22. Delays in airplane take-offs was recorded for flights at an airport. The table and histogram for this information is shown below.

Flight delay (minutes)	Frequency
$0 < t \leq 15$	33
$15 < t \leq 30$	18
$30 < t \leq 60$	12
$60 < t \leq 100$	
$100 < t \leq 120$	2



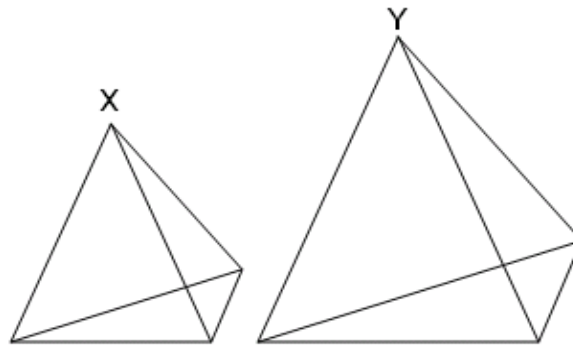
- a) Complete the table (2)
- b) Complete the histogram (2)

23. Two triangular based pyramids X and Y are mathematically similar.

The surface area of X is 32 cm^2 and the surface area of Y is 72 cm^2

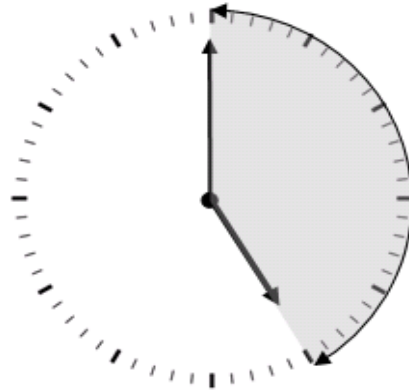
The volume of Y is 540 cm^3 .

Calculate the volume of X



..... cm^3 (4)

24.



Clock Face – 36cm diameter

A circular clock face is 36 cm in diameter. The clock shows 5pm

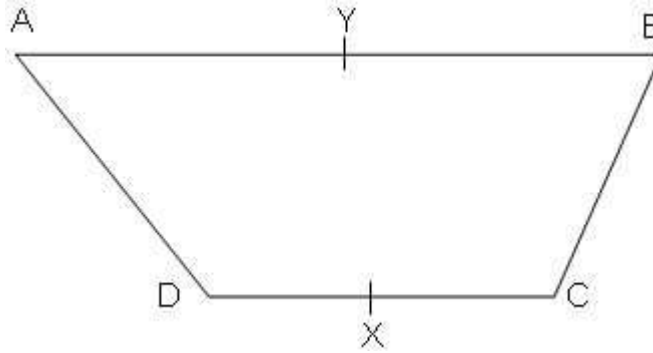
- a) Calculate the area between the minute hand and hour hand of the clock
Leave your answer in terms of π

..... cm² (2)

- b) Calculate the distance of the arc between the minute hand and hour hands.
Leave your answer in terms of π

..... cm (2)

25.



ABCD is a trapezium with AB parallel to DC

$$AD = 3b \quad AB = 6a \quad DC = 4a$$

Y is the mid point of AB and X is the mid point of DC

a) Find the vector BC in terms of a and b

$$= \dots\dots\dots (1)$$

b) Find the vector XY in terms of a and b

$$= \dots\dots\dots (2)$$

P is the mid point of YX and Q is the midpoint of BC

c) Prove that PQ is parallel to DC

(2)

26. a) What is $\sqrt{20}$ in the form $p\sqrt{5}$

P is an integer

..... (2)

b) Rationalise the denominator

$$\frac{2 + \sqrt{3}}{\sqrt{3}}$$

..... (2)