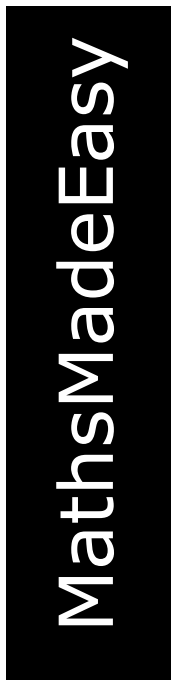


First Name	
Last Name	
Date	
Total Marks	/ 100 marks



GCSE Mathematics
Non-Calculator
Higher Tier
Mock 1, paper 1
1 hour 45 minutes



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

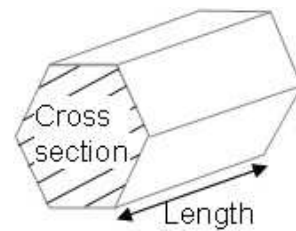
Advice

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

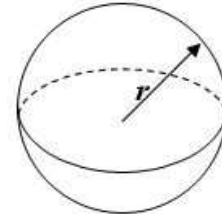
Formulae sheet — Higher tier

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



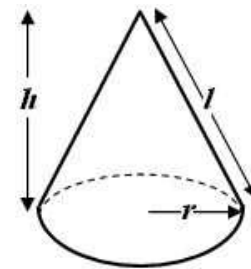
Volume of sphere = $\frac{4}{3} \pi r^3$

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



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

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

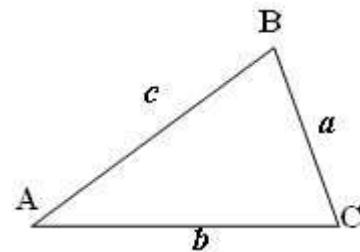


In any triangle ABC

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.

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1. $4y^2 = 256$

a) Find a value for y

$y = \dots\dots\dots$

(2)

b) Express 144 as a product of its prime factors

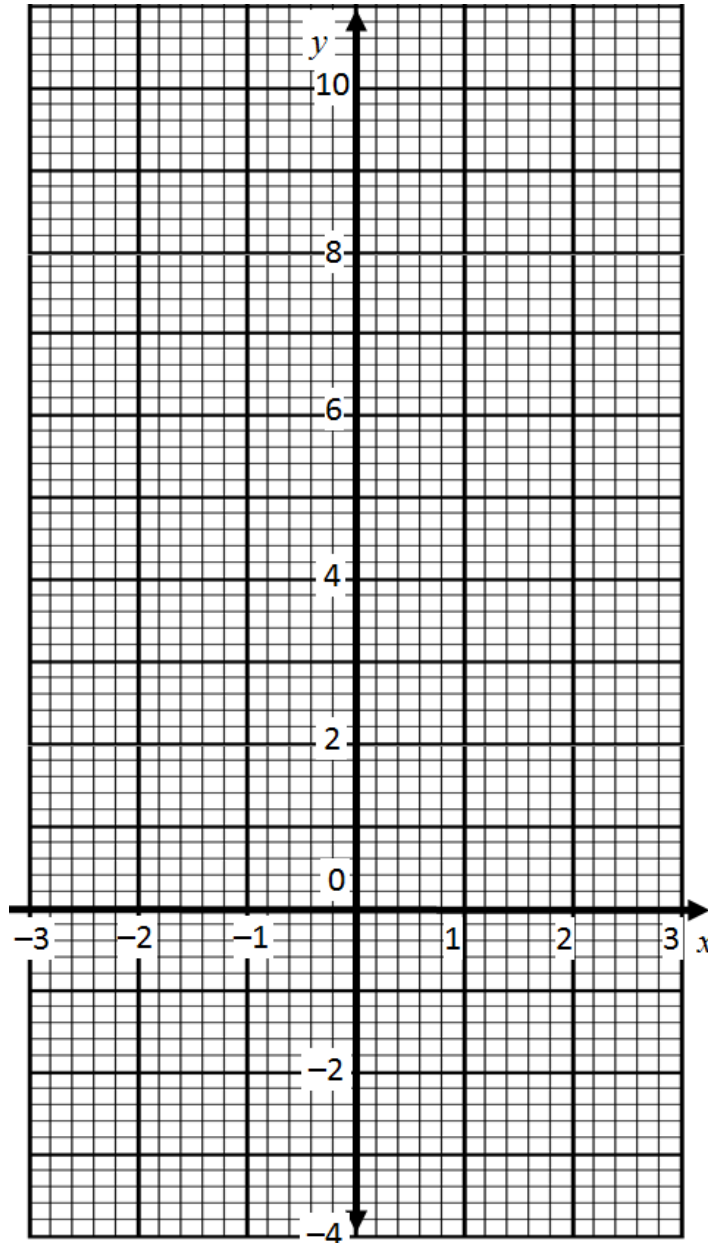
(3)

2. a) Complete the table of values for $y = x^2 - x - 2$ below

x	-3	-2	-1	0	1	2	3
y	10		0		-2		4

(2)

b) Draw the graph for $y = x^2 - x - 2$ on the grid below



(2)

c) Use your graph to estimate the values of x when $y = 2$

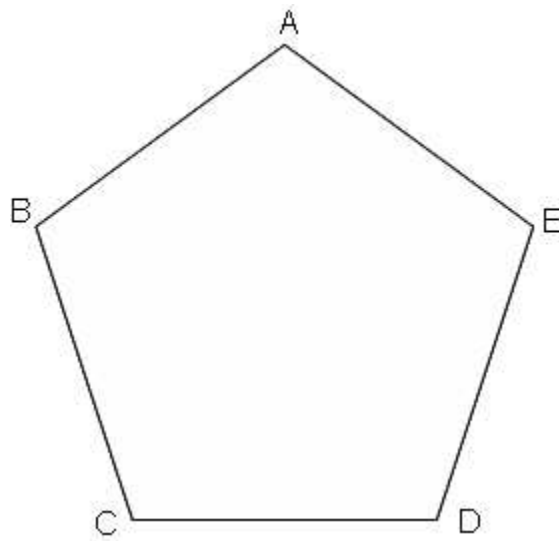
$x = \dots\dots\dots$
 $x = \dots\dots\dots$

(2)

3. A glass ball has a volume of 15 cm^3
The density of glass is $2.5 \text{ grams per cm}^3$
Work out the mass of the glass ball

.....grams (2)

4.



ABCDE is a pentagon
Shade the area inside the pentagon which is both
more than 3 centimetres from A **and**
more than 2 centimetres from the line DE

(4)

5. David did a survey of the time in hours, people spent watching TV in a week. He recorded his results in the following table.

Time (t hours)	Frequency
$0 < t \leq 5$	10
$5 < t \leq 10$	13
$10 < t \leq 15$	16
$15 < t \leq 20$	12
$20 < t \leq 25$	9

A person is selected at random from David's survey

- b) Estimate the probability that the person selected spent longer than 15 hours watching TV

..... (2)

6. Estimate the following:

$$\frac{809 \times 1.912}{0.395}$$

..... (3)

7. A glass ball has a mass of 258grams correct to the nearest gram.

a) What is the **greatest** possible mass for the ball

.....grams (1)

b) What is the **least** possible mass for the ball

.....grams (1)

8. Laura wanted to know how much time students spent watching TV programs.

She used the question below on her questionnaire.

“How much TV did you watch this week?”

<input type="checkbox"/>	<input type="checkbox"/>
Not much	Quite a lot

This question is not good.

Design a better question that Laura can use to find out how much time students spend watching TV programs. Include some response boxes.

(2)

9. Write the following in standard form

a) 618 000

..... (1)

b) 0.000056

..... (1)

c) 18×10^5

..... (1)

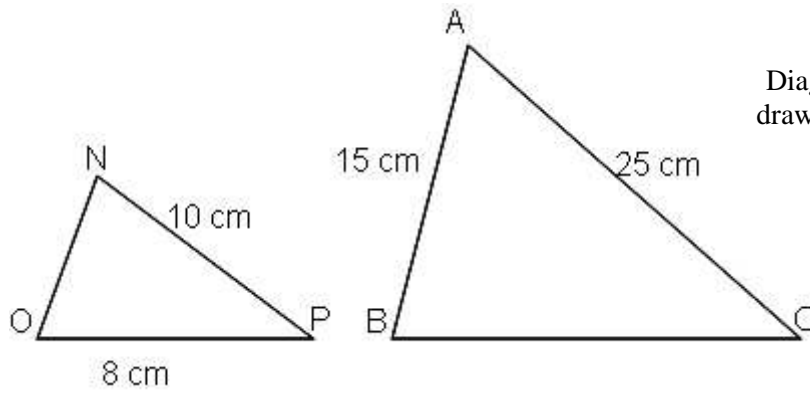
10. a) Factorise $x^2 + 7x + 10$

..... (2)

b) Solve $x^2 + 7x + 10 = 0$

x =
x = (2)

11.



Diagrams NOT drawn accurately

The two triangles NOP and ABC are mathematically similar.

Angle N = angle A

Angle P = angle C

OP = 8 cm; NP = 10 cm

AC = 25 cm; AB = 15 cm

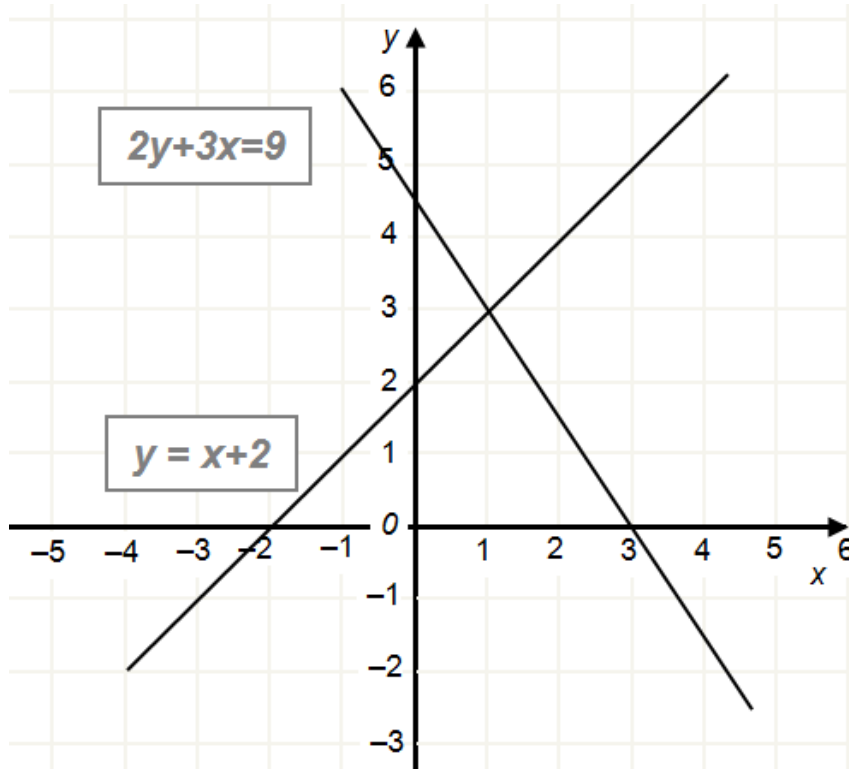
a) What is the length of BC

.....cm (2)

b) What is the length of NO

.....cm (2)

12. On the grid below are two straight lines with equations $2y + 3x = 9$ and $y = x + 2$.



a) Using the graphs find the solution to the simultaneous equations

$$\begin{aligned} 2y + 3x &= 9 \\ y &= x + 2 \end{aligned}$$

$x = \dots\dots\dots$ (1)
 $y = \dots\dots\dots$

b) $2y + 3x > 9$ $y < x + 2$ $x < 4$ and x and y are integers

Find and mark the *six* points on the grid which satisfy all these three inequalities (3)

13. Jane's weekly pay this year is £360.
This is 25% more than her weekly pay last year.

Matthew says "Jane's weekly pay last year must have been £270".
Matthew is wrong

a) Explain why

.....
.....

(1)

b) Work out Jane's weekly pay last year.

£.....

(2)

14. A survey of 80 children was made to see how long they spent playing computer games in a week

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

Time (t hours)	Frequency
$5 \leq t < 10$	10
$10 \leq t < 15$	16
$15 \leq t < 20$	30
$20 \leq t < 25$	21
$25 \leq t < 30$	3

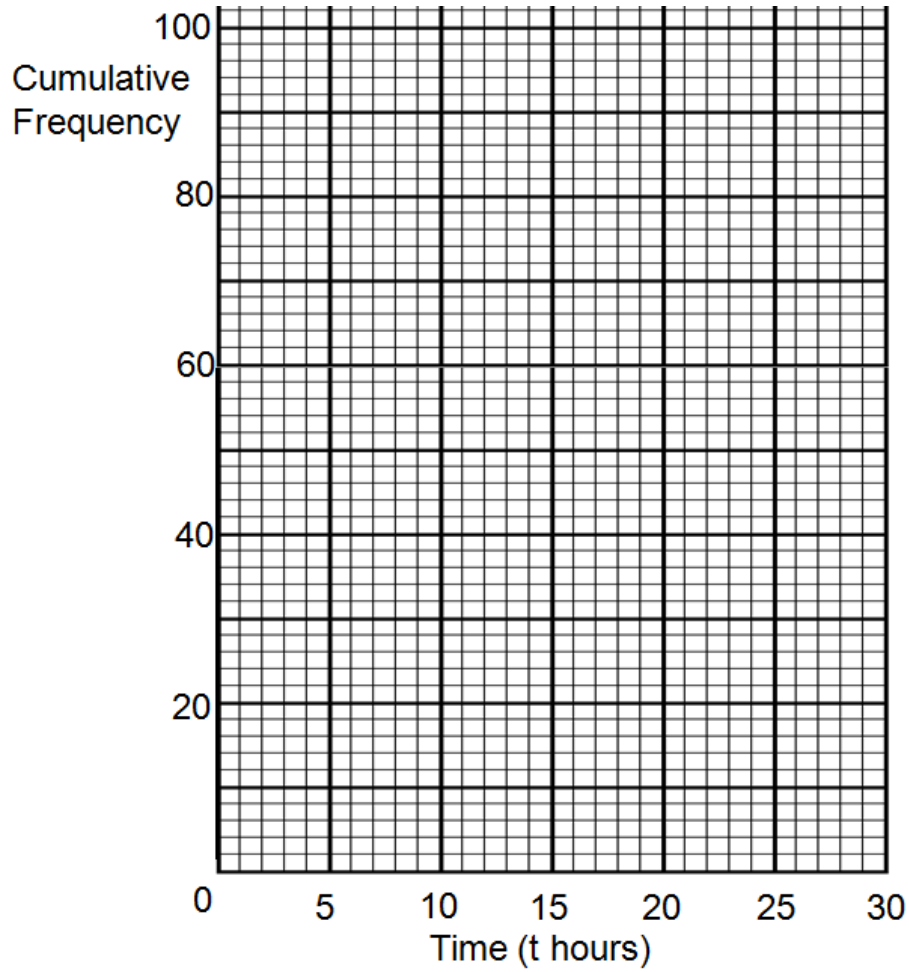
- a) Complete the cumulative frequency table

(1)

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

- b) Using your completed table draw a cumulative frequency graph on the grid

(2)



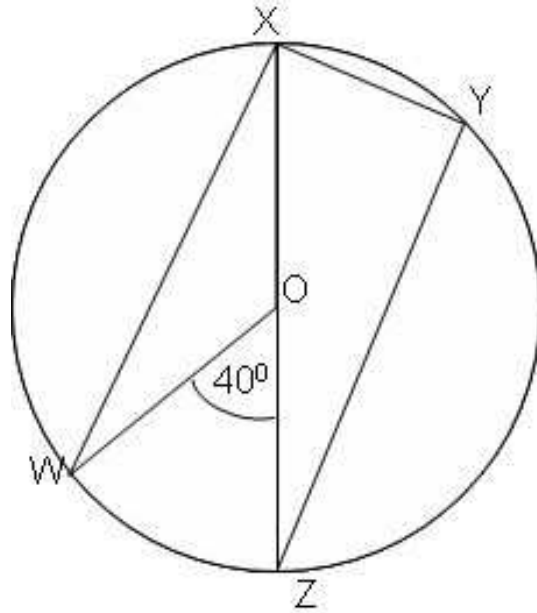
- c) Using the completed graph estimate the median time
Remember to state the units in your answer

.....

(2)

15.

Diagram NOT
drawn accurately



W, X, Y and Z are points on the circumference of a circle, centre O.
XOZ is a straight line and angle WOZ is 40°

a) What is the size of angle XYZ giving a reason for your answer

.....^o (2)

b) What is the size of angle WXZ giving a reason for your answer.

.....^o (2)

16. The resistance R ohms of a wire is directly proportional to the length l of the wire

When $l = 150$, $R = 750$

a) Find R when $l = 450$

$R = \dots\dots\dots$ (3)

The resistance R ohms of a wire is inversely proportional to the cross sectional area A of the wire.

When $A = 0.1$, $R = 180$

a) Find R when $A = 0.09$

$R = \dots\dots\dots$ (3)

17.

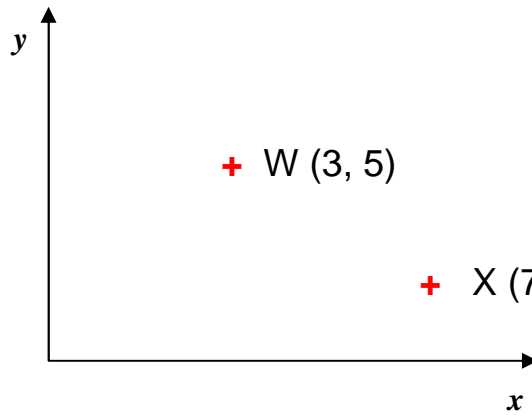


Diagram not drawn accurately

The diagram above shows two points W and X
W is the point (3, 5)
X is the point (7, 2)

a) Write down the vector \overrightarrow{WX} as a column vector $\begin{pmatrix} x \\ y \end{pmatrix}$

$\begin{pmatrix} \\ \end{pmatrix}$
..... (2)

WXYZ is a parallelogram

$$\overrightarrow{WY} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$$

b) Find the vector \overrightarrow{XZ} and write as a column vector $\begin{pmatrix} x \\ y \end{pmatrix}$

$\begin{pmatrix} \\ \end{pmatrix}$
..... (2)

18. a) Solve $\frac{5}{4a} + \frac{5}{a} = 4$

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

a) Using your answer to part (a) or otherwise,

Solve $\frac{5}{4(b-1)^2} + \frac{5}{(b-1)^2} = 4$

or $b = \dots\dots\dots$
 $b = \dots\dots\dots$ (3)

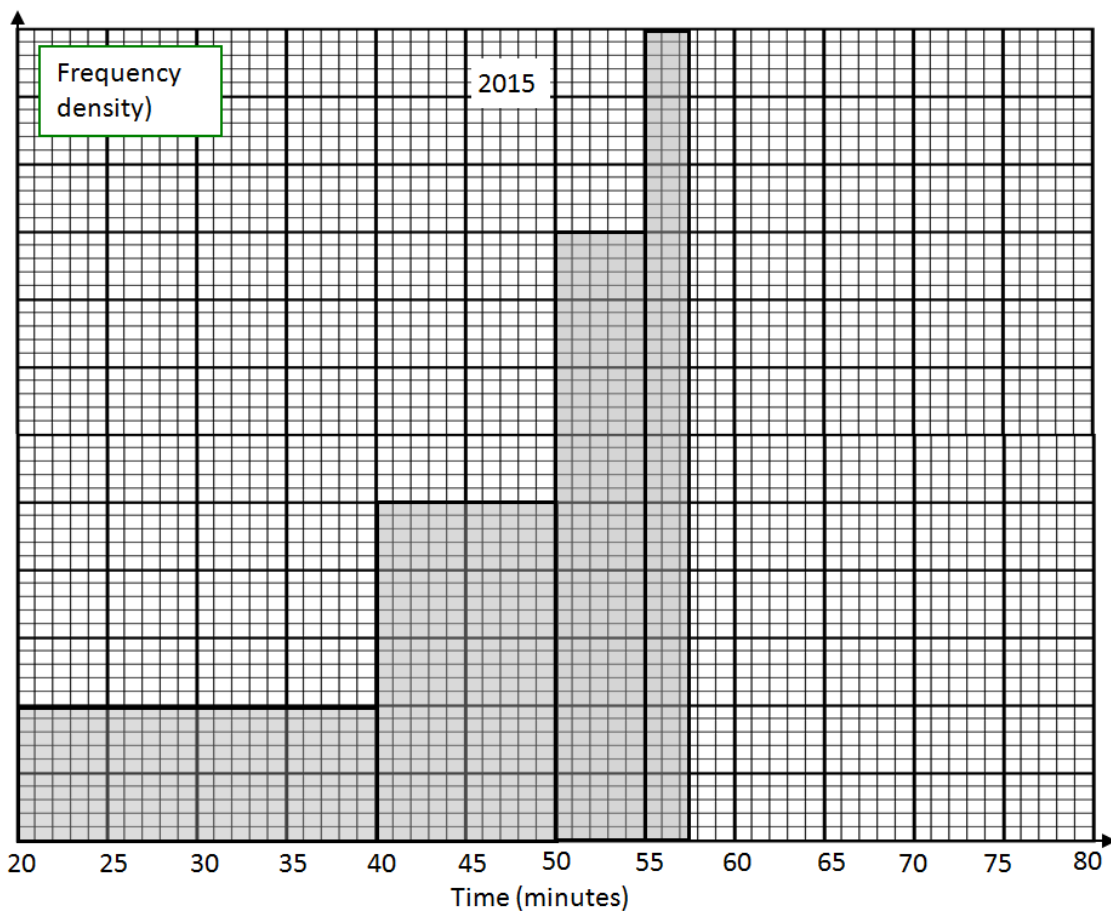
19. The table and histogram show information about the time it took 235 students to complete their homework.

Time (t minutes)	Frequency
$20 < t \leq 40$	
$40 < t \leq 50$	
$50 < t \leq 55$	45
$55 < t \leq 57.5$	
$57.5 < t \leq 60$	25
$60 < t \leq 75$	45

None of the students took longer than 75 minutes.

a) Use the table to complete the histogram

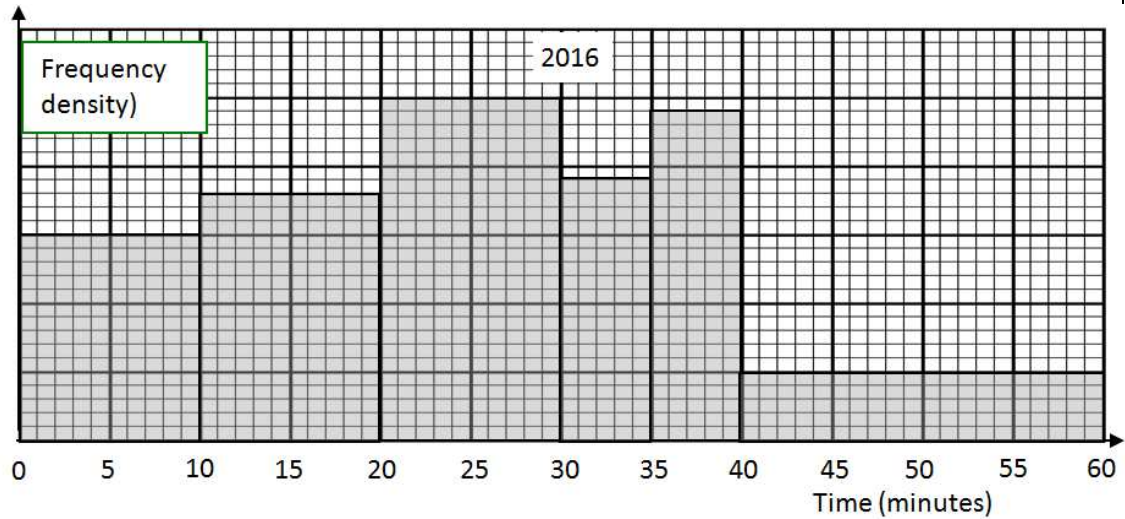
b) Use the histogram to complete the table



(2)

(2)

- 19b.** The histogram below shows information about the time it took some adults to read their e-mails at work.
None of them took more than 60 minutes.



120 people took up to 15 minutes to read their e-mails.

- c) Using the histogram work out an estimate for the number of adults who took 29 minutes or longer to read their e-mails

.....

(3)

20. a) Find the value of $64^{\frac{1}{3}}$

..... (1)

b) $12\sqrt{12}$ can be written as 12^m
Find the value of m

m = (1)

$12\sqrt{12}$ can also be expressed in the form $p\sqrt{3}$ where P is a positive integer

c) Express $12\sqrt{12}$ in the form $p\sqrt{3}$

..... (2)

d) Rationalise the denominator of $\frac{1}{12\sqrt{12}}$

Give your answer in the form $\frac{\sqrt{3}}{m}$ where m is a positive integer

..... (2)

21.

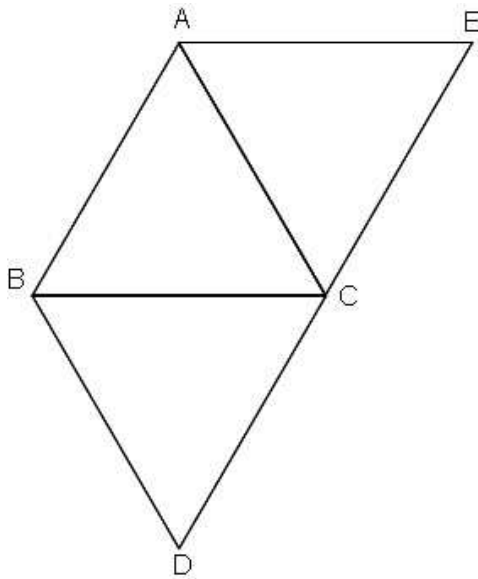


Diagram NOT drawn accurately

ABC is an equilateral triangle
BDC is an equilateral triangle
AEC is an equilateral triangle

a) Prove that triangle ABE and Triangle ABD are congruent

(3)

F is a point such that EBDF is a parallelogram.

b) Prove that $DF = AD$

(2)

22.

$$y = \frac{x^2 - 2z}{x + 2z}$$

Rearrange the formula to make z the subject

$z = \dots\dots\dots$ (4)

23. a) Factorise $2x^2 - 10x + 8$

$\dots\dots\dots$ (2)

b) i) Factorise fully $(p^2 - q^2) - (p - q)^2$

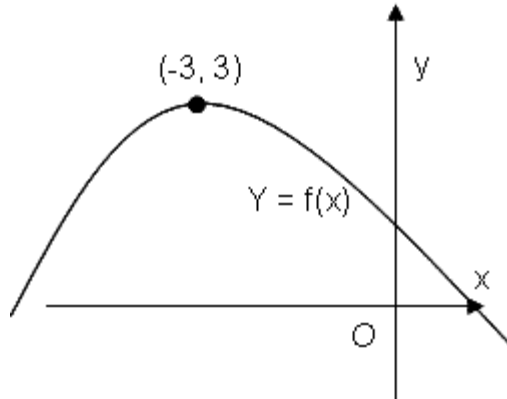
$\dots\dots\dots$

p and q are integers

ii) Explain why $(p^2 - q^2) - (p - q)^2$ is always an even integer

$\dots\dots\dots$
 $\dots\dots\dots$
 $\dots\dots\dots$ (4)

24.



The diagram above shows part of a curve with the equation $y = f(x)$
The maximum point is $(-3, 3)$

a) What are the co-ordinates of the maximum point of the curve with the equations below:

i) $y = f(x - 2)$

.....

ii) $y = 2f(x)$

.....

iii) $y = f(3x)$

.....

(3)

The curve $y = f(x)$ is reflected in the y axis

b) Find the equation of the curve after the reflection.

.....

(1)

The curve with the equation $y = f(x)$ has been transformed to the curve with the equation $y = f(x) - 2$

c) Describe the transformation

.....

(1)

.....