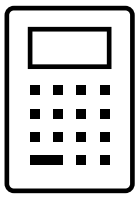
Surname:	Forename(s):

GCSE Mathematics – Higher Tier

Paper 2 – Calculator



Practice Set B

/40

Materials

- **Formulae Sheet** (on the next page)
- **Black** ink or ball-point pen
- Pencil
- Eraser
- Protractor
- Compass
- Tracing Paper
- **Calculator allowed**

Instructions

- Time allowed: **45 minutes.**
- The total mark for this paper is **40**.
- Show **all** of your working.
- Draw diagrams in pencil.
- Plot graphs in pencil.
- Diagrams are **not** accurately drawn, unless otherwise indicated.
- Cross through any work you don't want to be marked

Higher Tier Formulae Sheet

Perimeter, Area and Volume

Where a and b are the lengths of the parallel sides and h Is their perpendicular separation:

Area of a trapezium = ½ (a + b) h

Volume of a prism = area of cross section x length

Where r is the radius and d is the diameter:

Circumference of a circle = 2πr = πd

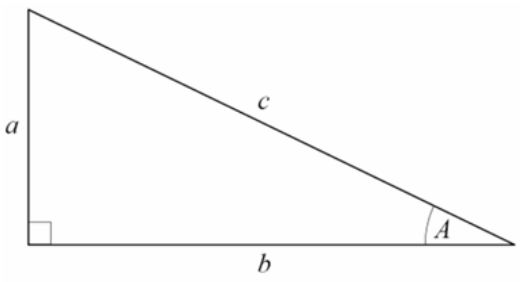
Area of a circle = πr^2

Quadratic Formula

The solution of $ax^2 + bx + c = 0$ where $a \neq 0$

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

Pythagoras' Theorem and Trigonometry

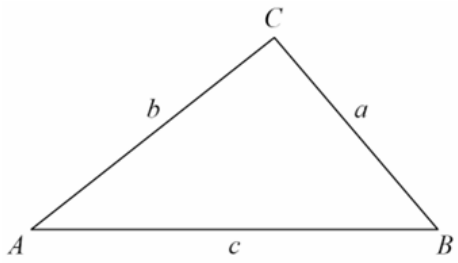


In any right-angled triangle where a, b and c are the length of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle ABC where a, b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \qquad \cos A = \frac{b}{c} \qquad \tan A = \frac{a}{b}$$



In any triangle ABC where a, b and c are the length of the sides:

$$\text{sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

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

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

$$\text{Total accrued} = P\left(1 + \frac{r}{100}\right)^n$$

Probability

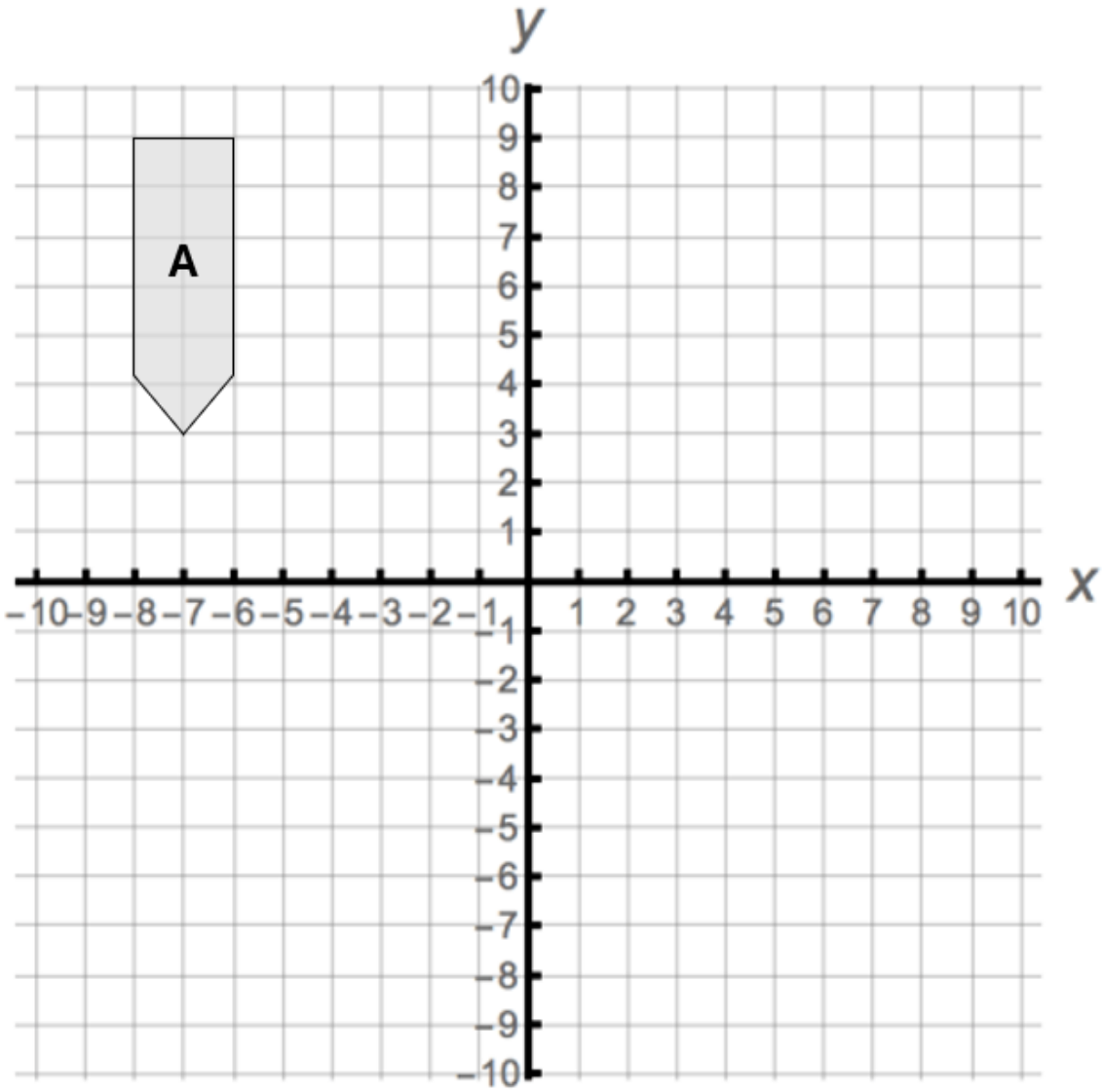
Where P (A) is the probability of outcome A

and P (B) is the probability of outcome B:

P (A or B) = P (A) + P (B) – P (A and B)

P (A and B) = P (A given B) P(B)

1



(a) Reflect Shape A in the line x = -1
Label this as Shape B

(2)

(b) Translate Shape A by the vector $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$
Label this as Shape C

(1)

(Total for question 1 is 3 marks)

2 Benji hires a carpet cleaner

The cost per day is £16.80 for the first 3 days.
On day 4, the cost is reduced by 15%.
From day 4 onwards, the cost is the same as it is on day 4.

The total cost of hiring the carpet cleaner came to £178.92

How many days did Benji hire the carpet cleaner for?
You must show your working.

_____ days

(Total for question 2 is 5 marks)

3 Fred, Greta and Hugo share some money in the ratio 2 : 5 : 3

Greta has £135

Greta gives some of her share to Fred.

Hugo also gives some of his share to Fred.

The money that Fred, Greta and Hugo have now is in the ratio 5 : 6 : 4

How much money did Fred receive in total from Greta and Hugo?

£ _____

(Total for question 3 is 4 marks)

4 The size of each interior angle in a regular polygon is 168°.

Work out how many sides this polygons has.

_____ sides

(Total for question 4 is 2 marks)

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5 Expand and simplify $(x - 4) (2x + 5)^2$

_____

(Total for question 5 is 3 marks)

6 (a) Show that the equation $3x^3 - x^2 - 5 = 0$ can be rearranged to give $x = \sqrt{\frac{5}{3x - 1}}$

(1)

(b) Using $X_{n+1} = \sqrt{\frac{5}{3x - 1}}$

With $X_0 = 2$

Find the values of X_1, X_2 and X_3

X_1 = _____

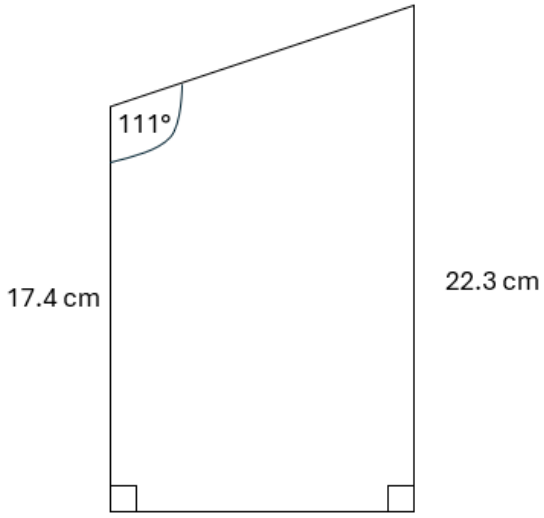
X_2 = _____

X_3 = _____

(3)

(Total for question 6 is 4 marks)

7 Work out the area of the trapezium



_____ cm

(Total for question 7 is 4 marks)

8 The equation of a circle is $x^2 + y^2 = 16$

What is the radius of the circle.

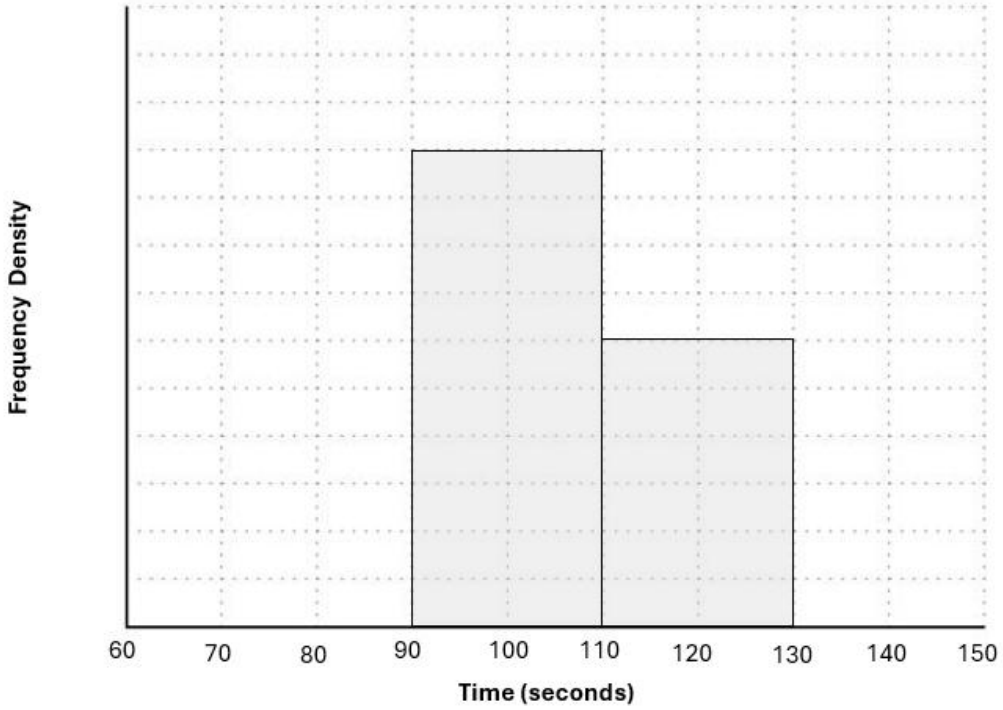
_____

(Total for question 8 is 1 mark)

9 The table shows information about the time taken (t) in seconds for a group of people to complete a 500m sprint.

Time (seconds)	Frequency
$60 \leq t < 70$	5
$70 \leq t < 90$	20
$90 \leq t < 110$	40
$110 \leq t < 130$	
$130 \leq t < 150$	6

(a) Use the information in the table to complete the histogram.
(b) Use the histogram to complete the table.



(Total for question 9 is 4 marks)

10 Enith is setting a new 4 digit passcode on her phone.
Each digit in a number from 1-9
She can use each number more than once.

Given that:

- The first digit is an even number
- The second digit is less than 4
- The third digit is a square number
- The fourth digit is a factor of 20

What is the probability that someone could guess Enith's password on their first attempt.

_____

(Total for question 10 is 3 marks)

11 Show that $\frac{x - 4}{x + 3} + \frac{x - 2}{x - 3}$ can be written as $\frac{ax^2 - bx + b}{x^2 - 9}$

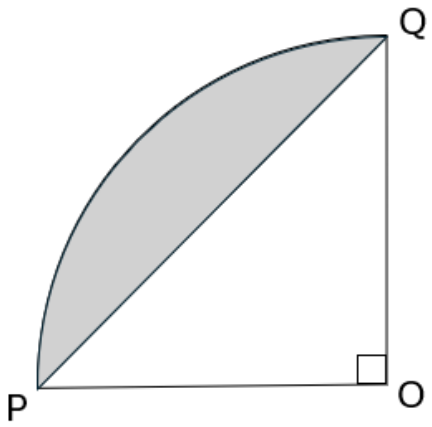
where a and b are integers to be found.

a = _____

b = _____

(Total for question 11 is 3 marks)

12 The diagram shows a sector OPQ of a circle with centre O and radius 7cm.
PQ is a straight line.



Work out the area of the shaded segment as a percentage of sector OPQ.

Give your answer correct to 3 significant figures

_____ %

(Total for question 12 is 4 marks)

END OF TEST

TOTAL FOR THIS PAPER IS 40 MARKS