

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9-1)

Wednesday 8 November 2023

Morning (Time: 1 hour 30 minutes)

Paper
reference

1MA1/1H

Mathematics

**PAPER 1 (Non-Calculator)
Higher Tier**



You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, Formulae Sheet (enclosed). Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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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:

$$\text{Area of a trapezium} = \frac{1}{2} (a + b) h$$

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

Where r is the radius and d is the diameter:

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

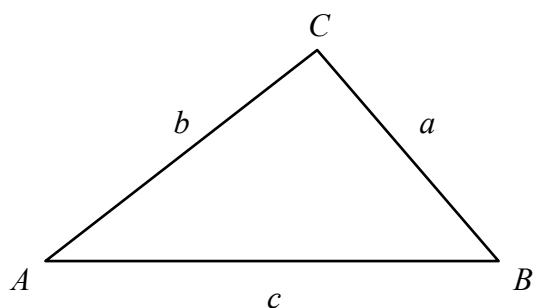
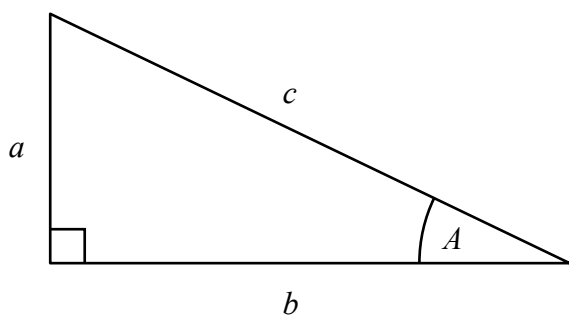
Quadratic formula

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:

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

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

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

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

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

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 :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A \text{ given } B) P(B)$$

END OF EXAM AID

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Work out 6.3×2.4

.....
(Total for Question 1 is 3 marks)

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2 (a) (i) Write down the value of 5^0

.....
(1)

(ii) Write down the value of 5^{-2}

.....
(1)

(b) Write $\frac{2^5 \times 2^4}{2^3}$ in the form 2^n where n is an integer.

.....
(2)

(Total for Question 2 is 4 marks)

3 (a) Write 156 as a product of its prime factors.

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(2)

(b) Find the highest common factor (HCF) of 156 and 130

(2)

(Total for Question 3 is 4 marks)



- 4 The mean length of 5 sticks is 4.2 cm.

Nawal measured the length of one of the sticks as 7 cm.

- (a) Work out the mean length of the other 4 sticks.

..... cm
(3)

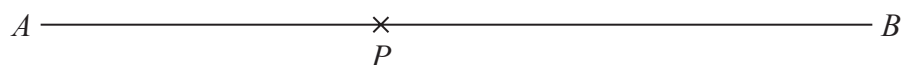
Nawal made a mistake.
The stick was not 7 cm long.
It was 17 cm long.

- (b) How does this affect your answer to part (a)?

(1)

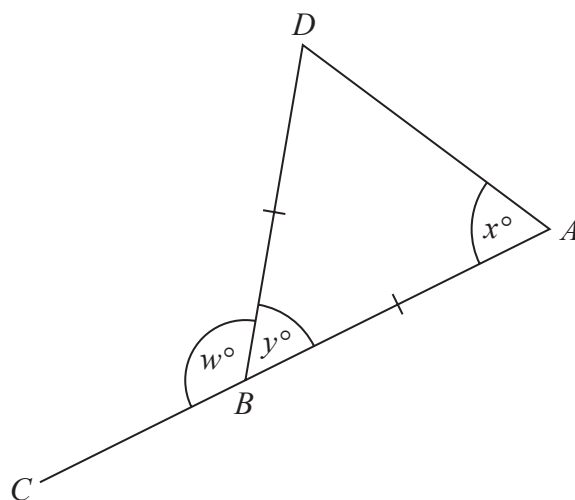
(Total for Question 4 is 4 marks)

- 5 The point P lies on the line AB .
Use ruler and compasses to construct an angle of 90° at P .
You must show all your construction lines.



(Total for Question 5 is 2 marks)

- 6 The diagram shows an isosceles triangle ABD and the straight line ABC .



$$BA = BD$$

$$x:y = 2:1$$

Work out the value of w .

$$w = \dots\dots\dots$$

(Total for Question 6 is 4 marks)

7 Mano has three shelves of books.

There are x books on shelf **A**.

There are $(3x + 1)$ books on shelf **B**.

There are $(2x - 5)$ books on shelf **C**.

There is a total of 44 books on the three shelves.

All the books have the same mass.

The books on shelf **B** have a total mass of 7500 g.

Work out the total mass of the books on shelf **A**.

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(Total for Question 7 is 5 marks)



- 8 The normal price of a mattress is reduced by 40% in a sale.
The price of the mattress in the sale is £660

Work out the normal price of the mattress.

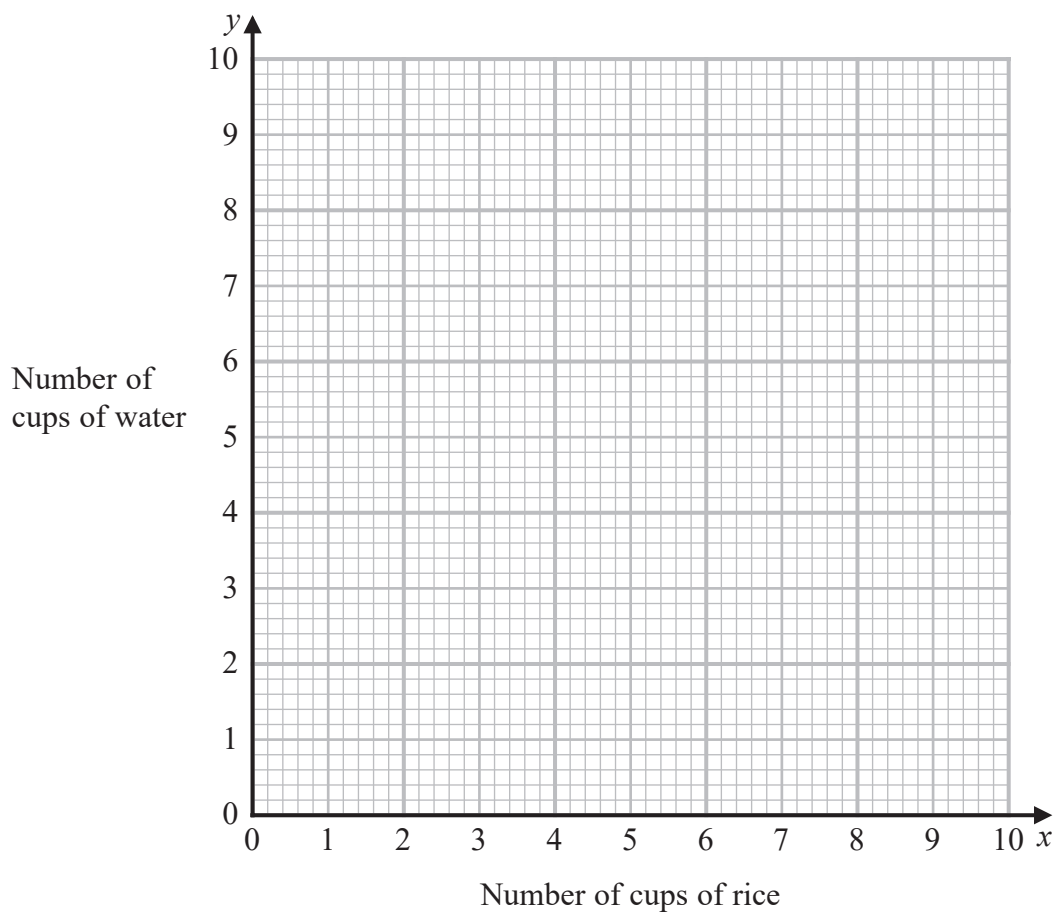
£.....

(Total for Question 8 is 2 marks)

9 To cook rice

the number of cups of rice (x): the number of cups of water (y) = 4 : 5

- (a) Use this information to draw a graph to show the relationship between the number of cups of rice and the number of cups of water needed to cook rice.



(2)

- (b) (i) Find the gradient of the line drawn in part (a).

(1)

- (ii) Explain what this gradient represents.

(1)

(Total for Question 9 is 4 marks)

10 The circumference of a circle is 10m.

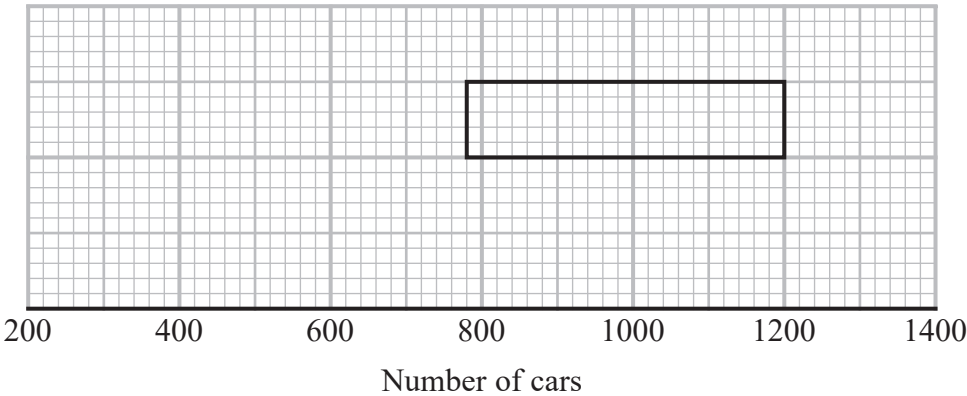
Work out the area of the circle.
Give your answer in terms of π .

..... m²

(Total for Question 10 is 3 marks)

- 11 Alice recorded the number of cars going into a village on each of 80 days.
- The incomplete table and the incomplete box plot give information about her results.

	Number of cars
Least number	300
Lower quartile	
Median	900
Upper quartile	
Range	1000



- (a) (i) Use the information in the table to complete the box plot.
- (ii) Use the information in the box plot to complete the table.

(3)

On some of these 80 days Alice saw fewer than 1200 cars going into the village.

- (b) Work out an estimate for the number of days Alice saw fewer than 1200 cars going into the village.

(2)

(Total for Question 11 is 5 marks)

12 The straight line **L** has equation $2y = 3x - 7$

Find an equation of the straight line perpendicular to **L** that passes through $(6, -5)$

(Total for Question 12 is 3 marks)

13 Solid **A** and solid **B** are similar.

The ratio of the height of solid **A** to the height of solid **B** is $2:5$

The volume of solid **A** is 12 cm^3

Work out the volume of solid **B**.

..... cm^3

(Total for Question 13 is 3 marks)

14 Work out the value of $27^{\frac{2}{3}} + \left(\frac{1}{2}\right)^{-3}$

(Total for Question 14 is 3 marks)

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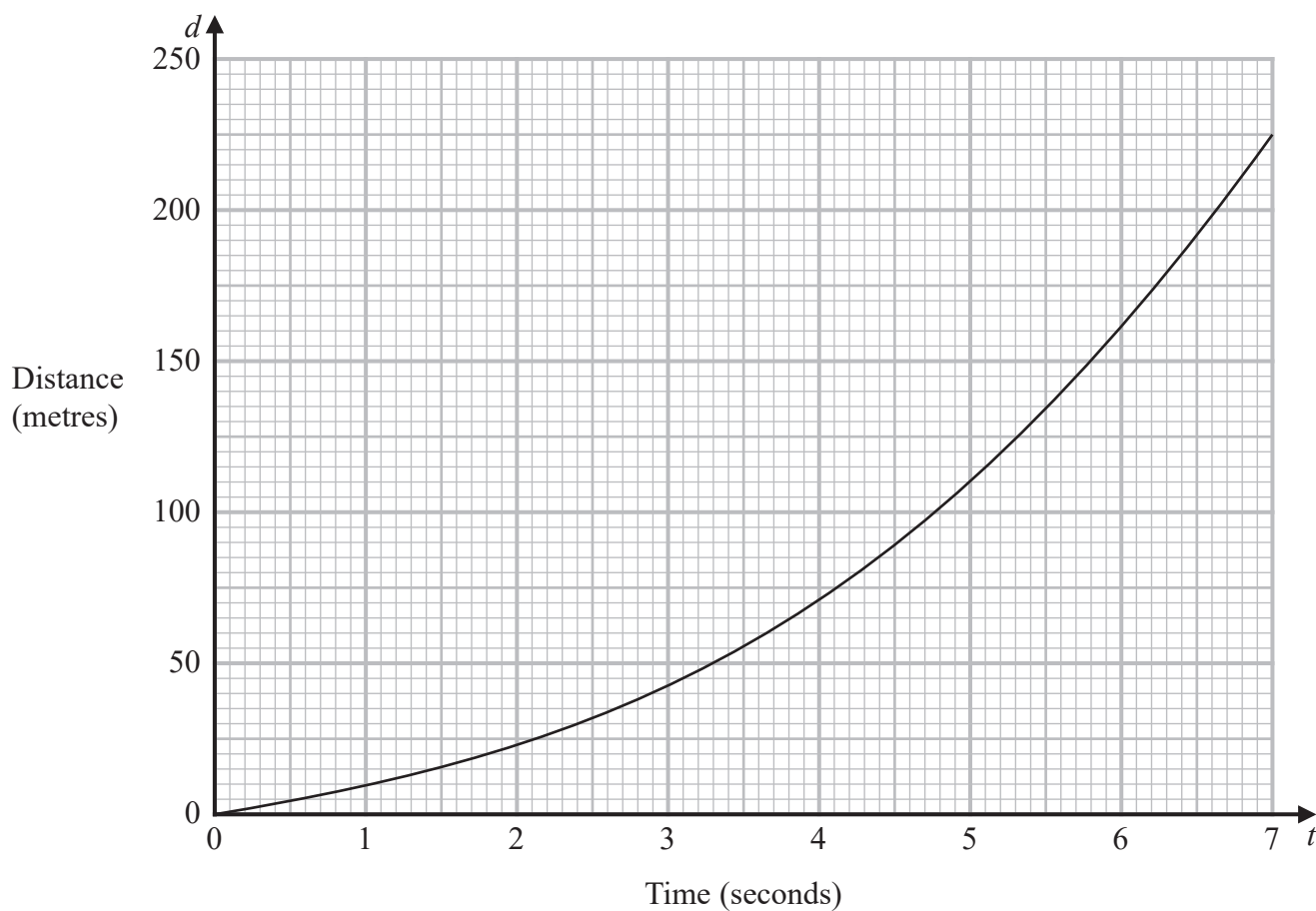
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15 An object falls from rest.

Here is the distance-time graph for the distance (d metres) fallen by the object t seconds after it starts to fall.



Work out an estimate for the gradient of the graph at $t = 3$
You must show how you get your answer.

(Total for Question 15 is 3 marks)

16 At the start of year n the population of a species is P_n

At the start of the following year the population of the species is given by

$$P_{n+1} = kP_n \text{ where } k \text{ is a positive constant.}$$

The population of the species at the start of year 1 is 8 million.

The population of the species at the start of year 2 is 6 million.

(a) Work out the population of the species at the start of year 3

..... million
(3)

At the start of year 5 the value of k is increased by 0.3 to a new constant value.

Louise thinks that from the start of year 5 the population of the species would increase year on year.

(b) Is Louise correct?

You must give a reason for your answer.

(1)

(Total for Question 16 is 4 marks)

17 (a) Factorise $6x^2 - 5x - 4$

.....
(2)

(b) Hence, or otherwise, solve $6x^2 - 5x - 4 < 0$

.....
(2)

.....
(Total for Question 17 is 4 marks)

18 Spinner **A** and spinner **B** are each spun once.

The probability that spinner **A** lands on red is $\frac{1}{4}$

The probability that both spinner **A** and spinner **B** land on red is $\frac{1}{24}$

Work out the probability that one spinner lands on red and the other spinner does **not** land on red.

(Total for Question 18 is 4 marks)

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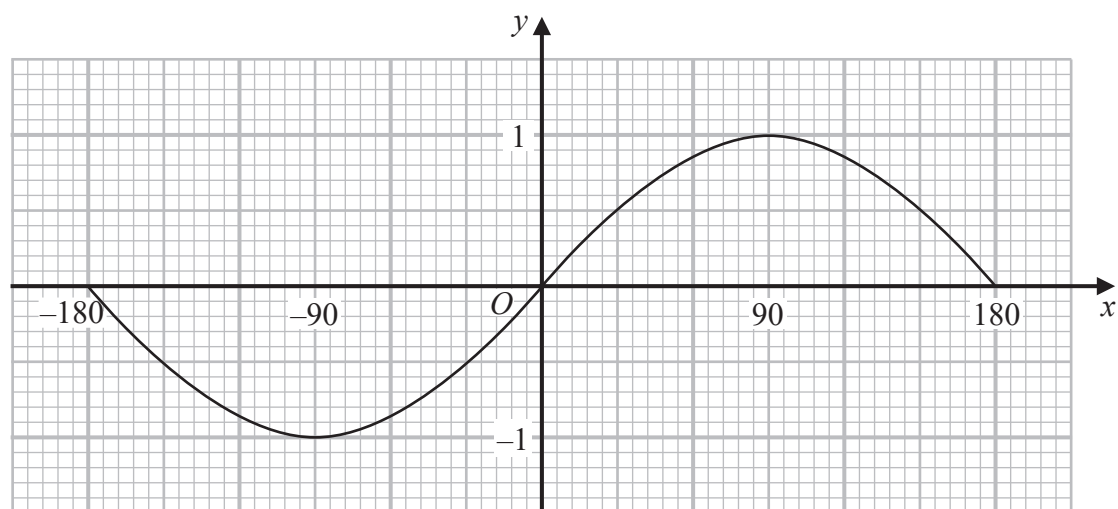
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19 Here is the graph of $y = \sin x^\circ$ for $-180 \leq x \leq 180$



(a) Use the graph to find estimates for the solutions of

$$\sin x^\circ = 0.3 \quad \text{for } -180 \leq x \leq 180$$

.....
(2)

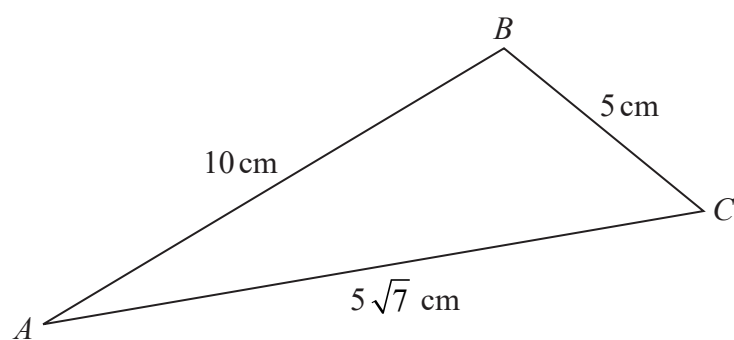
(b) Write down a value of x such that

$$\sin(x + 20)^\circ = 0 \quad \text{for } -180 \leq x \leq 180$$

$x =$
(1)

(Total for Question 19 is 3 marks)

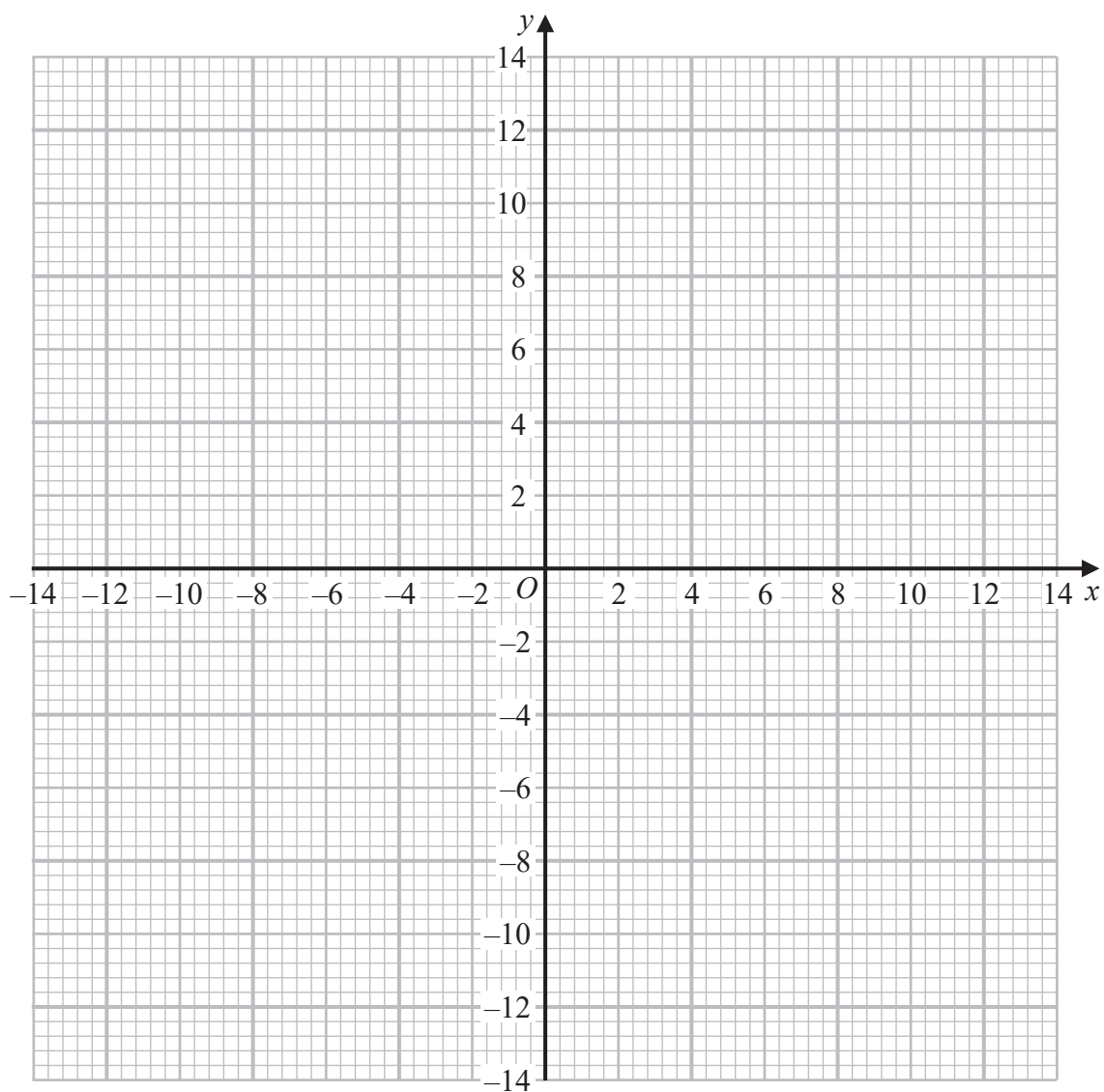
20 Here is triangle ABC .



Find the size of angle ABC .
You must show all your working.

(Total for Question 20 is 4 marks)

21 (a) On the grid, draw the graph of $x^2 + y^2 = 169$



(2)

(b) Use your graph to find estimates for the solutions of the simultaneous equations

$$x^2 + y^2 = 169$$

$$2y = 3x$$

(3)

(Total for Question 21 is 5 marks)

- 22 The 2nd term of a geometric sequence is $3 + 2\sqrt{2}$
The 3rd term of the sequence is $13 + 9\sqrt{2}$

Find the value of the common ratio of the sequence.

Give your answer in the form $a + \sqrt{b}$ where a and b are integers.

You must show all your working.

.....
(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

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