Pearson Edexcel International GCSE

Centre Number

Candidate Number

Mathematics A
Level 1/2
Paper 2H

Higher Tier

Specimen Paper
Time: 2 hours

Paper Reference
4MA1/2H

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

Arithmetic series

Sum to n terms, $S_n = \dfrac{n}{2}\,[2a + (n - 1)d]$

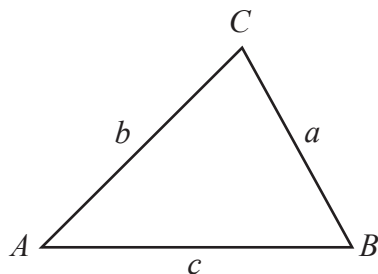**The quadratic equation**

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

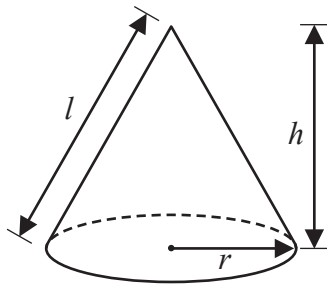$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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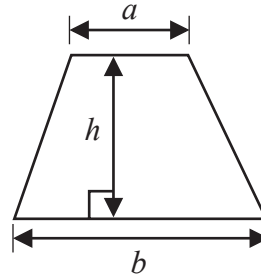
Trigonometry

In any triangle ABC

Sine Rule $\quad \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

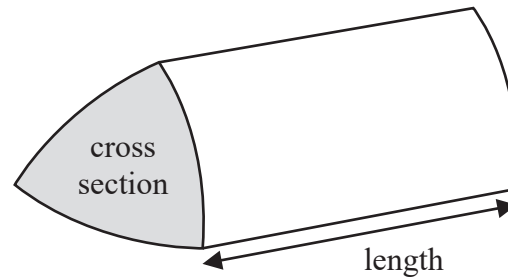**Area of triangle** $= \dfrac{1}{2}ab\sin C$

Volume of cone $= \dfrac{1}{3}\pi r^2 h$
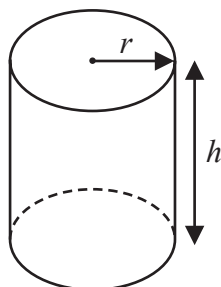
Curved surface area of cone $= \pi rl$

Volume of prism
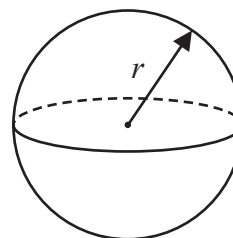= area of cross section × length

Volume of cylinder $= \pi r^2 h$
**Curved surface area
of cylinder** $= 2\pi rh$

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

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

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Simplify $3e^7f \times 4e^2f$

....

(2)

(b) Simplify fully $(27a^{12})^{\frac{2}{3}}$

....

(2)

(c) Solve the inequality $2q \geqslant 31 - 3q$

....

(2)

$-2 \leqslant n < 3$

n is an integer

(d) Write down all the possible values of n.

....

(2)

(Total for Question 1 is 8 marks)

2 The diagram shows a circle and a trapezium.

Diagram **NOT** accurately drawn

8.5 cm

20 cm

h cm

25 cm
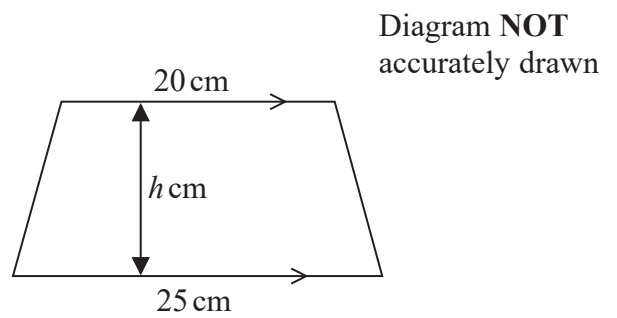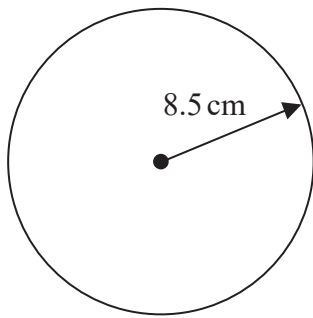
The height of the trapezium is h cm.

The area of the circle is equal to the area of the trapezium.

Work out the value of h.
Give your answer correct to 1 decimal place.

....

(Total for Question 2 is 4 marks)

3 In a bag there are only red bricks, blue bricks, green bricks and orange bricks.

The number of green bricks in the bag is the same as the number of orange bricks.

Jiao takes at random a brick from the bag.
The table gives the probability that Jiao takes a red brick and the probability that he takes a blue brick.

Colour	red	blue	green	orange
Probability	0.26	0.3		

(a) Work out the probability that Jiao takes an orange brick.

....

(3)

Jiao puts the brick back into the bag.
There are 91 red bricks in the bag.

Jiao is going to build a tower using all the red bricks and all the blue bricks but no other bricks.
The tower will be in the shape of a cuboid.
There will be 4 bricks in each layer of the tower.

(b) Work out how many layers the tower will have.

....

(3)

(Total for Question 3 is 6 marks)

4 Here are the first five terms of a number sequence.

$$7 \qquad 11 \qquad 15 \qquad 19 \qquad 23$$

(a) Find an expression, in terms of n, for the nth term of this sequence.

....

(2)

The nth term of a different number sequence is given by $80 - 2n$

(b) Write down the first 3 terms of this sequence.

.... , ... , ...

(2)

Yuen says there are no numbers that are in both of the sequences.
Yuen is correct.

(c) Explain why.

....

....

(1)

(Total for Question 4 is 5 marks)

5 Aayush invests 18 000 rupees for 3 years at a rate of 4% per year compound interest.

Work out the total amount of interest Aayush has received by the end of 3 years.
Give your answer correct to the nearest rupee.

.... rupees

(Total for Question 5 is 3 marks)

6

Diagram **NOT**
accurately drawn

8 cm

x

12 cm
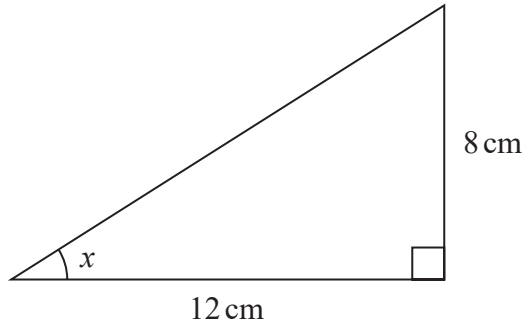
Calculate the size of angle x.
Give your answer correct to 1 decimal place.

....°

(Total for Question 6 is 3 marks)
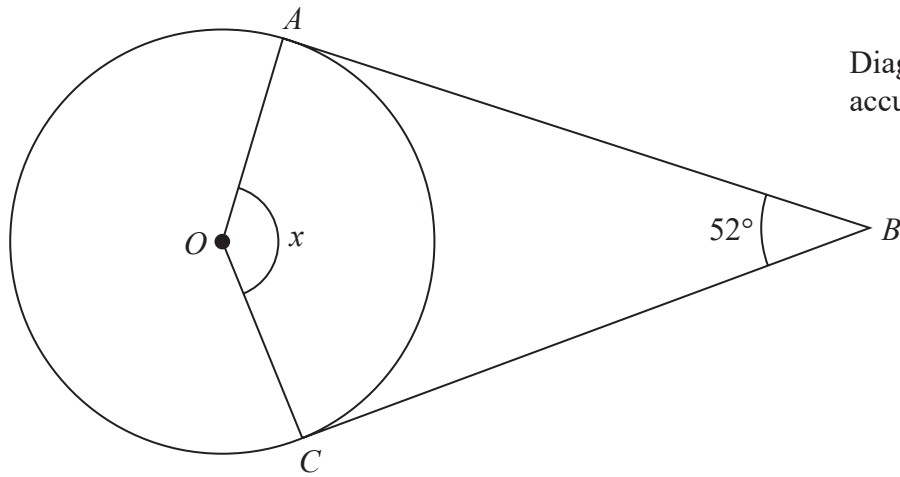
7

Diagram **NOT** accurately drawn

A and C are points on a circle, centre O.
AB and CB are tangents to the circle.
Angle $ABC = 52°$

Work out the size of angle x.
Give a reason for each stage of your working.

$x = $...°

(Total for Question 7 is 4 marks)

8

8 Ahmed, Behnaz and Carmen each have some money.

Ahmed has 20% more money than Behnaz.

Carmen has $\dfrac{7}{8}$ of the amount of money that Behnaz has.

Carmen has 31.50 euros.

Work out how much money Ahmed has.

.... euros

(Total for Question 8 is 3 marks)

Turn over ▶

9 The frequency table shows information about the ages of 60 people on a train.

Age (a years)	Frequency
$0 < a \leqslant 10$	4
$10 < a \leqslant 20$	14
$20 < a \leqslant 30$	17
$30 < a \leqslant 40$	13
$40 < a \leqslant 50$	7
$50 < a \leqslant 60$	3
$60 < a \leqslant 70$	2

(a) Complete the cumulative frequency table.

Age (a years)	Cumulative frequency
$0 < a \leqslant 10$	
$0 < a \leqslant 20$	
$0 < a \leqslant 30$	
$0 < a \leqslant 40$	
$0 < a \leqslant 50$	
$0 < a \leqslant 60$	
$0 < a \leqslant 70$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.

Age (*a* years)
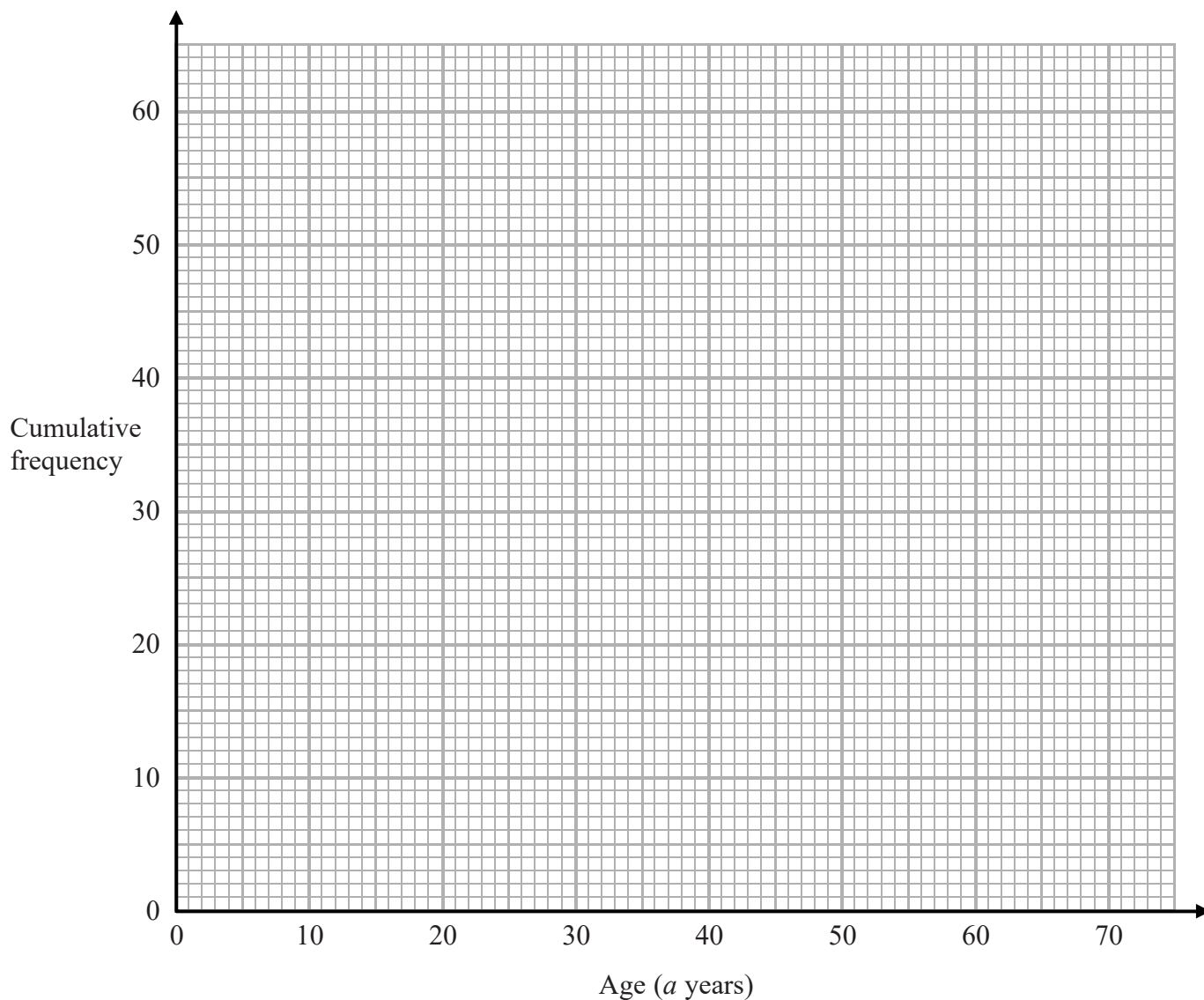
(2)

(c) Use your graph to find an estimate for the interquartile range of the ages of the 60 people.

.... years

(2)

(d) Use your graph to find an estimate for how many of the 60 people are more than 48 years of age.

....

(2)

(Total for Question 9 is 7 marks)

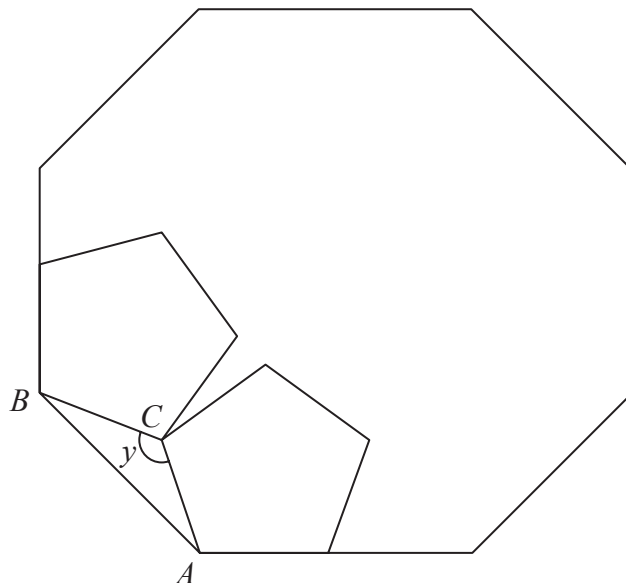**10** The diagram shows two congruent regular pentagons drawn inside a regular octagon.

Diagram **NOT** accurately drawn

One side of each pentagon lies along a side of the octagon.

AB is a side of the octagon.
AC is a side of one of the pentagons.
BC is a side of the other pentagon.

Work out the size of angle *y*.
Show your working clearly.

.... °

(Total for Question 10 is 5 marks)

11 Solve $\dfrac{3x-2}{5} - \dfrac{3-4x}{2} = 2$

Show clear algebraic working.

$x =$ ....

(Total for Question 11 is 4 marks)

12 $y = x^3 - 6x^2 - 15x$

(a) Find $\dfrac{dy}{dx}$

$$\dfrac{dy}{dx} = \text{...}$$
(2)

The curve with equation $y = x^3 - 6x^2 - 15x$ has two stationary points.

(b) Work out the coordinates of these two stationary points.

(............................ , ...)

(............................ , ...)
(4)

(Total for Question 12 is 6 marks)

13 In a school, students must study at least one language from German, French and Spanish.

There are 30 students in a class of this school.
Of these students

  7 study all three of the languages
10 study both German and French
12 study both Spanish and German
  9 study both French and Spanish
16 study Spanish
18 study German

Work out the total number of the students in the class who study French.
You may use the Venn diagram to help with your calculations.

German   French

Spanish

....
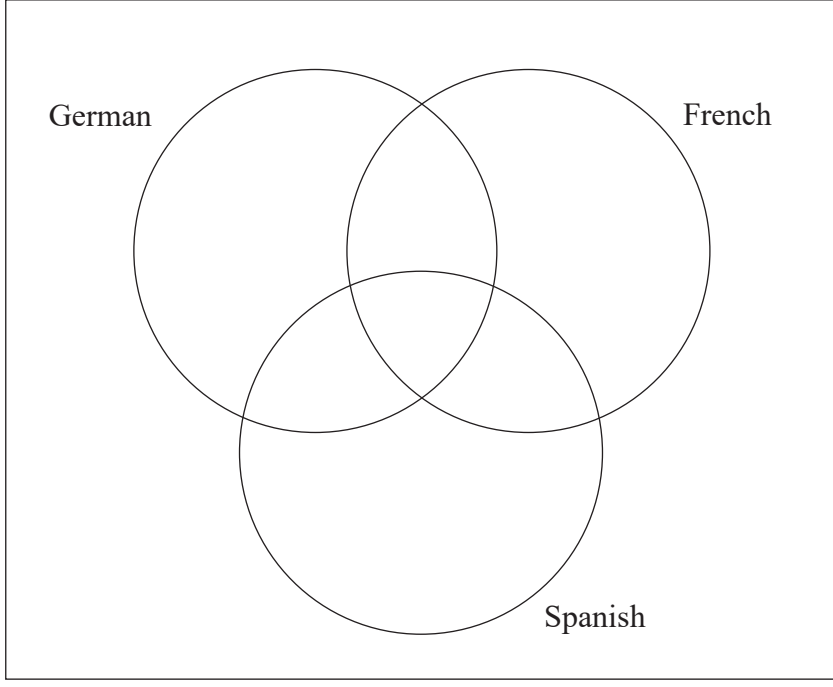
(Total for Question 13 is 3 marks)

14 (a) Use algebra to show that $\quad 0.3\dot{2}\dot{4} = \dfrac{107}{330}$

(2)

(b) Rationalise the denominator of $\quad \dfrac{4}{7 - \sqrt{5}}$

Show each stage of your working.

Give your answer in the form $a + b\sqrt{5}$ where a and b are fractions in their simplest forms.

(3)

(Total for Question 14 is 5 marks)

15 Sophie takes an examination.
If she fails the examination, she will resit.

The probability that Sophie passes the examination on her first attempt is 0.7
If she fails the examination on any attempt, the probability she passes on the next attempt is 0.9

Work out the probability that Sophie takes at most 2 attempts to pass the examination.

....

(Total for Question 15 is 3 marks)

16 The diagram shows part of a sketch of the curve $y = \sin x°$
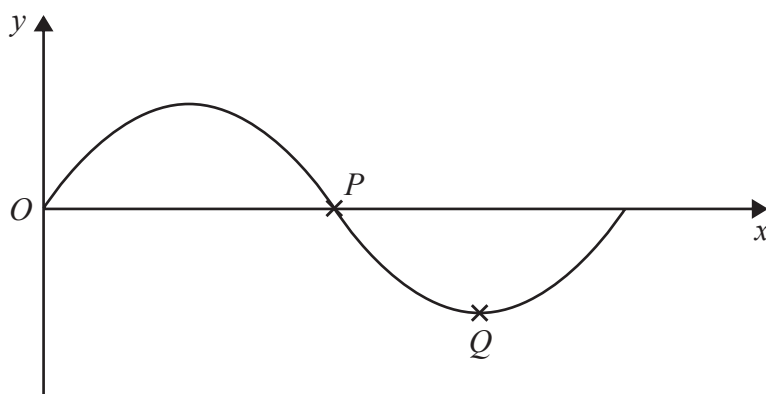
(a) Write down the coordinates of

   (i) the point P

(........................ , ...)

   (ii) the point Q

(........................ , ...)

(2)

(b) Sketch the graph of $y = \tan x$ for $0° \leqslant x \leqslant 360°$

Show the coordinates of any points of intersection with the coordinate axes.

(2)

(Total for Question 16 is 4 marks)

17 A solid metal cube has sides of length 125 mm, correct to 3 significant figures.

The cube is melted down and the metal used to make solid spheres.
The volume of each sphere is to be 140 cm³, correct to the nearest 10 cm³

Work out the greatest number of spheres that could be made from the metal.
Show your working clearly.

....

(Total for Question 17 is 4 marks)

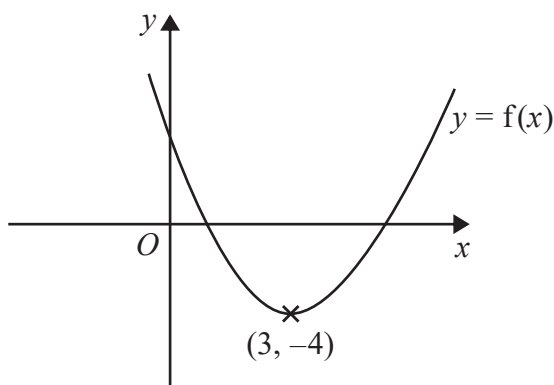**18** The diagram shows part of the curve with equation $y = f(x)$

Diagram **NOT** accurately drawn

The coordinates of the minimum point on this curve are $(3, -4)$

(a) Write down the coordinates of the minimum point on the curve with equation

(i) $y = f(x - 4)$

(.............................. , ...)

(ii) $y = 3f(x)$

(.............................. , ...)

(iii) $y = f(\frac{1}{2}x)$

(.............................. , ...)

(3)

The curve with equation $y = f(x)$ is translated to give curve C.

C has a minimum at the point with coordinates $(3, 5)$
The equation of C is $y = f(x) + k$

(b) Write down the value of k

$k = $ ....

(1)

(Total for Question 18 is 4 marks)

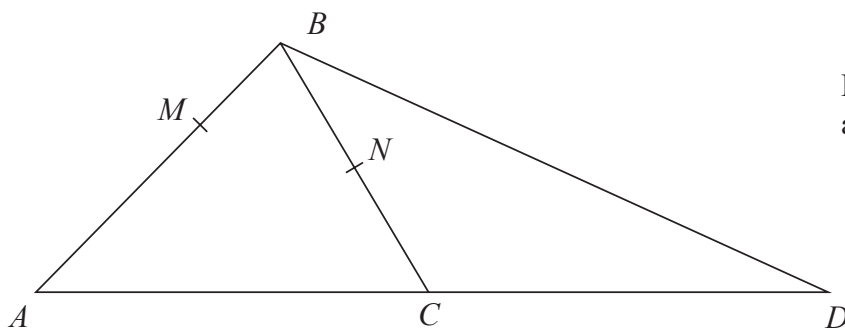S 5 6 2 8 4 A 0 2 0 2 4

19 The diagram shows triangle *ABD*.

Diagram **NOT** accurately drawn

N is the midpoint of *BC*.
C is the midpoint of *AD*.
M is the point on *AB* such that $AM:MB = 3:1$

$\overrightarrow{AB} = \mathbf{p}$ and $\overrightarrow{AC} = \mathbf{q}$

(a) Express, in terms of **p** and **q**,

  (i) $\overrightarrow{BD}$

....

  (ii) $\overrightarrow{MN}$

....

(3)

(b) State, giving reasons, two different geometric facts relating *MN* and *BD*.

(2)

(Total for Question 19 is 5 marks)

20 A cone has a volume of 562.5π cm^3

The radius of the base of the cone is equal to twice the height of the cone.

Work out the curved surface area of the cone.
Give your answer correct to 3 significant figures.

.... cm^2

(Total for Question 20 is 5 marks)

21 Write $\dfrac{5}{4x^2 - 25} - (2x + 3) \div \left(\dfrac{4x^2 + 16x + 15}{7} \right)$ as a single fraction in its simplest form.

Show clear algebraic working.

....

(Total for Question 21 is 4 marks)

22 The 3rd term of an arithmetic series, A, is 19
The sum of the first 10 terms of A is 290

Find the 10th term of A.

....

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS