GCSE Mathematics Practice Tests: Set 19

Paper 1H (Non-calculator)

Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

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*.
- **Calculators may be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The total mark for this paper is 80
- Questions are in order of mean difficulty as found by students achieving Grade 7.
- 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer all TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1   Solve the simultaneous equations

$$3x + 5y = 3.1$$

$$6x + 3y = 3.75$$

Show clear algebraic working.

$x =$ ....

$y =$ ....

(Total for Question 1 is 3 marks)

2   (*a*) Solve the inequality $5x - 7 \leq 2$

....
(2)

(*b*) (i)   Factorise $y^2 - 2y - 35$

....
(2)

(ii) Hence, solve $y^2 - 2y - 35 = 0$

....
(1)

(Total for Question 2 is 5 marks)

3 (*a*) Simplify $a^7 \times a^4$

....
(1)

(*b*) Simplify $w^{15} \div w^3$

....
(1)

(*c*) Simplify $(8x^5y^3)^2$

....
(2)

(*d*) Make t the subject of $c = t^3 - 8v$

....
(2)

(Total for Question 3 is 6 marks)

4   (*a*) Expand and simplify $(y + 4)(2 - y)$

....
(2)

(*b*) Factorise fully $15b^5c - 35b^3c^9$

....
(2)

(Total for Question 4 is 4 marks)

5 Show that $6\dfrac{3}{4} \div 2\dfrac{4}{7} = 2\dfrac{5}{8}$

(Total for Question 5 is 3 marks)

6   Expand and simplify $5x(x + 2)(3x - 4)$

....

(Total for Question 6 is 3 marks)

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7 $\mathscr{E} = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

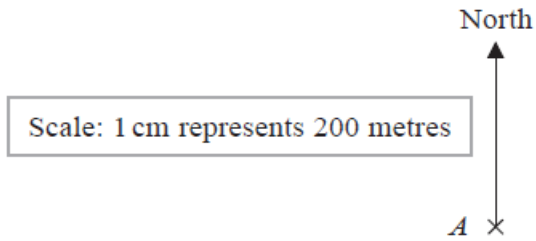$A \cap B = \{5, 10, 15\}$

$B' = \{7, 8, 9, 11, 12, 13, 14\}$

$A' = \{4, 6, 7, 8, 14\}$

Complete the Venn diagram for this information.
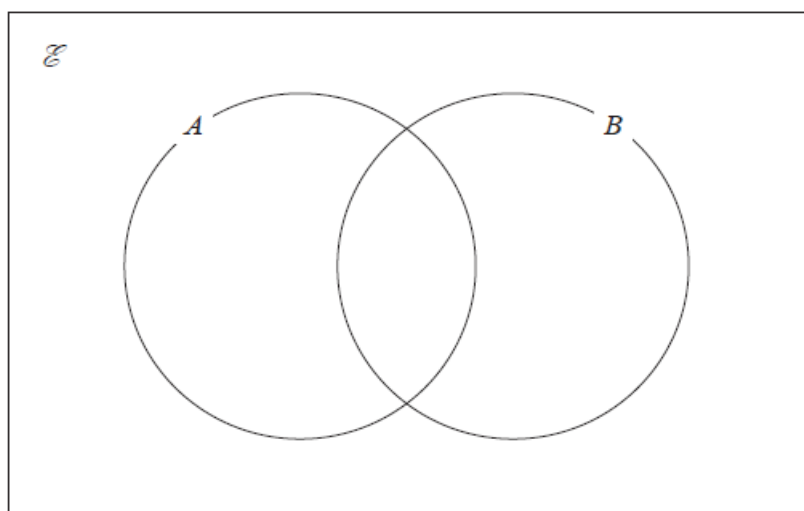
(Total for Question 7 is 3 marks)

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8   The scale diagram shows the position on a map of a house, *A*

North

Scale: 1 cm represents 200 metres

A ✕

House *C* is on a bearing of 110° from *A*
The distance from *A* to *C* is 700 m

(*a*) Mark the position of *C* on the diagram with a cross (✕)
       Label your cross *C*

(3)

(*b*) Write the scale of the map in the form 1 : *n*

1 : ....
(1)

(Total for Question 8 is 4 marks)

9   The straight line **L** has equation $2y + 7x = 10$

(*a*) Find the gradient of **L**

....
(2)

(*b*) Find the coordinates of the point where **L** crosses the *y*‑axis.

(...................... , ...)
(1)

(Total for Question 9 is 3 marks)

10   Diyar recorded the distance, in kilometres, that he cycled each day for 11 days.
Here are his results.

8   10   12   13   5   23   21   7   5   16   14

Find the interquartile range of his results.

.... km

(Total for Question 10 is 3 marks)

11
$$a = 4.2 \times 10^{-24} \qquad b = 3 \times 10^{145}$$

(*a*) Work out the value of $a \times b$
Give your answer in standard form.

....

(2)

$$a = 6 \times 10^{40}$$

(*b*) Work out the value of a^3
Give your answer in standard form.

....

(3)

(Total for Question 11 is 5 marks)

12   Simplify completely $\left(\dfrac{16w^8}{y^{20}} \right)^{-\frac{3}{4}}$

....

(Total for Question 12 is 3 marks)

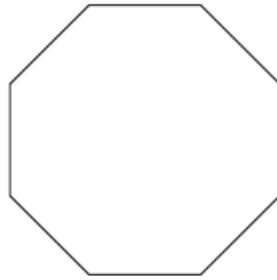**13** Each side of a regular octagon has a length of 18 mm, correct to the nearest 0.5 mm.

Diagram **NOT** accurately drawn

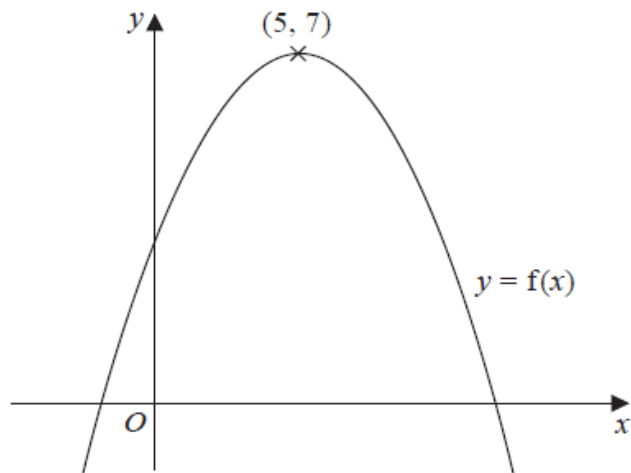(a) Write down the lower bound of the length of each side of the octagon.

.... mm

(1)

(b) Write down the upper bound of the length of each side of the octagon.

.... mm

(1)

(Total for Question 13 is 2 marks)

14 The diagram shows a sketch of the curve with equation $y = f(x)$

There is only one maximum point on the curve.
The coordinates of this maximum point are (5, 7)

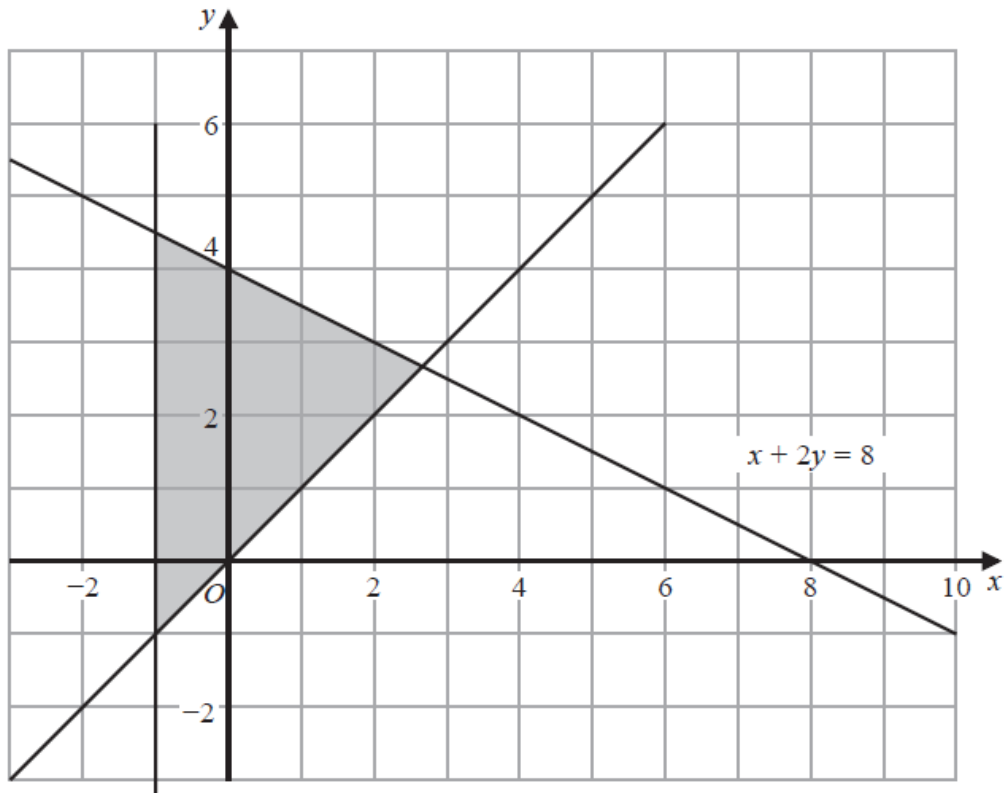Write down the coordinates of the maximum point on the curve with equation

(i) $y = f(x + 9)$

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

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

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

(Total for Question 14 is 2 marks)

15 The shaded region in the diagram is bounded by three lines.
The equation of one of the lines is given.

Write down three inequalities that define the shaded region.

$$x \geq 0$$

$$y \geq x + 1$$

$$x + 2y \leq 8$$

....

....

....

(Total for Question 15 is 3 marks)

16 Solve the simultaneous equations

$$3x^2 + y^2 - xy = 5$$
$$y = 2x - 3$$

Show clear algebraic working.

....

(Total for Question 16 is 5 marks)

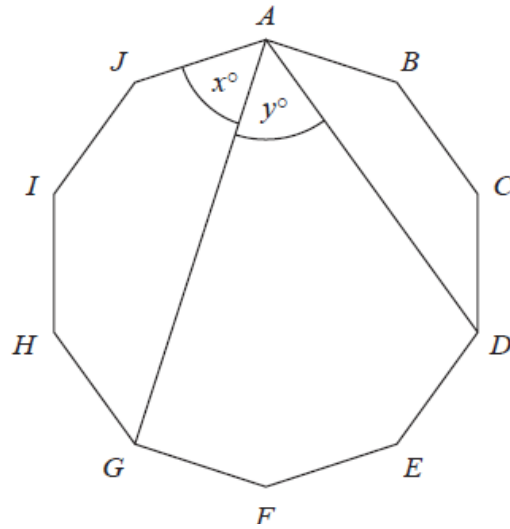**17** The diagram shows a regular 10-sided polygon, *ABCDEFGHIJ*
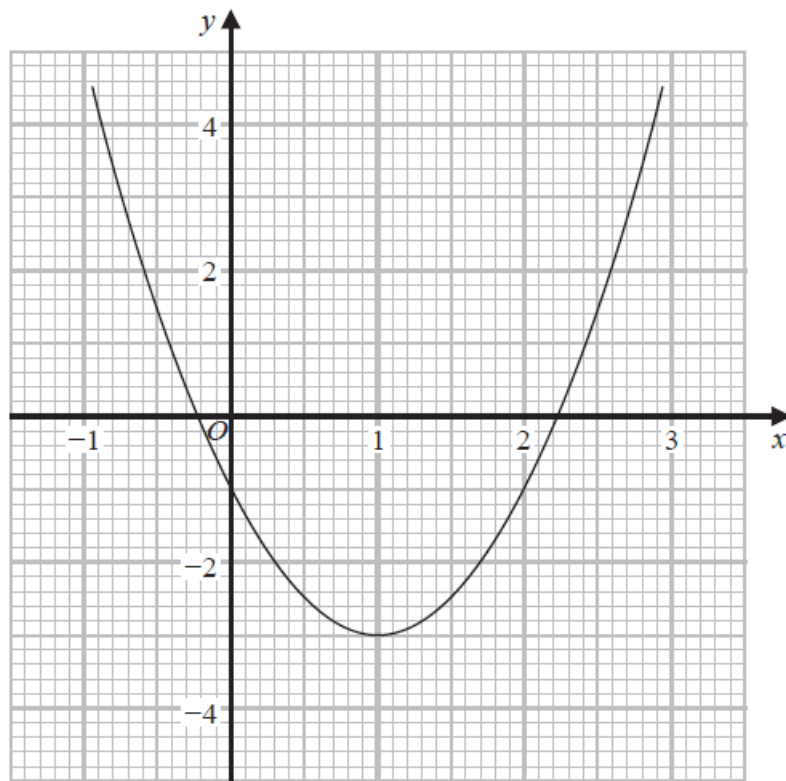

Diagram **NOT** accurately drawn

Show that $x = y$

(Total for Question 17 is 4 marks)

18 Show that $\dfrac{\sqrt{12}}{\sqrt{3}+2}$ can be written in the form $a+\sqrt{b}$ where a and b are integers.

(Total for Question 18 is 3 marks)

19 Part of the graph of $y = 2x^2 - 4x - 1$ is shown on the grid.

(a) Use the graph to find estimates for the solutions of the equation $2x^2 - 4x - 1 = 0$
Give your solutions correct to one decimal place.

....
(2)

(b) By drawing a suitable straight line on the grid, find estimates for the solutions of the equation $x^2 - x - 1 = 0$

Show your working clearly.
Give your solutions correct to one decimal place.

....
(3)

(Total for Question 19 is 5 marks)

20 Express $7 + 12x - 3x^2$ in the form $a + b(x + c)^2$ where a, b and c are integers.

....

(Total for Question 20 is 3 marks)

21 Prove that when the sum of the squares of any two consecutive odd numbers is divided by 8, the remainder is always 2

Show clear algebraic working.

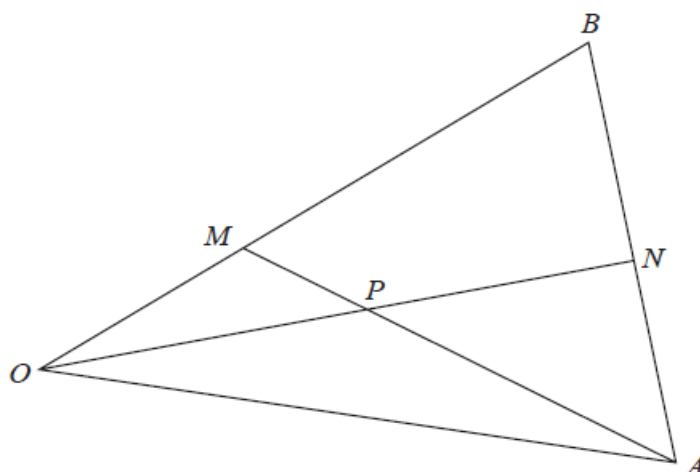**(Total for Question 21 is 3 marks)**

22 The diagram shows triangle *OAB*

Diagram **NOT** accurately drawn

$\overrightarrow{OA} = 8\mathbf{a}$ $\overrightarrow{OB} = 6\mathbf{b}$

M is the point on *OB* such that *OM* : *MB* = 1 : 2
N is the midpoint of *AB*
P is the point of intersection of *ON* and *AM*

Using a vector method, find $\overrightarrow{OP}$ as a simplified expression in terms of **a** and **b**
Show your working clearly.

$$\overrightarrow{OP} = \text{..}$$

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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