GCSE Mathematics Practice Tests: Set 15

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
- 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 questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $G = c^2 - 4c$

Find the value of G when $c = -5$

$G =$ .....

(Total for Question 1 is 2 marks)

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2 Solve $\frac{5x-3}{4} = 2x+3$

Show clear algebraic working.

$x =$ .....

(Total for Question 2 is 3 marks)

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3 Given that $150^x = 1$

(*a*) write down the value of x.

$x =$.....

(1)

Given that $3^{-8} \div 3^{-6} = 3^n$

(*b*) find the value of n.

$n =$.....

(1)

(Total for Question 3 is 2 marks)

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4 Solve the simultaneous equations

$$7x + 2y = 5.5$$
$$3x - 5y = 17$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 4 is 4 marks)

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5 (*a*) Factorise $x^2 - x - 42$

.....

(2)

(*b*) Solve the inequality $3x + 15 < 8x + 3$

Show clear algebraic working.

.....

(3)

(Total for Question 5 is 5 marks)

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6 Expand and simplify $(4x + 1)(x - 3)(5x + 6)$

.....

(Total for Question 6 is 3 marks)

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7 The frequency table gives information about the ages of the 80 people in a train carriage.

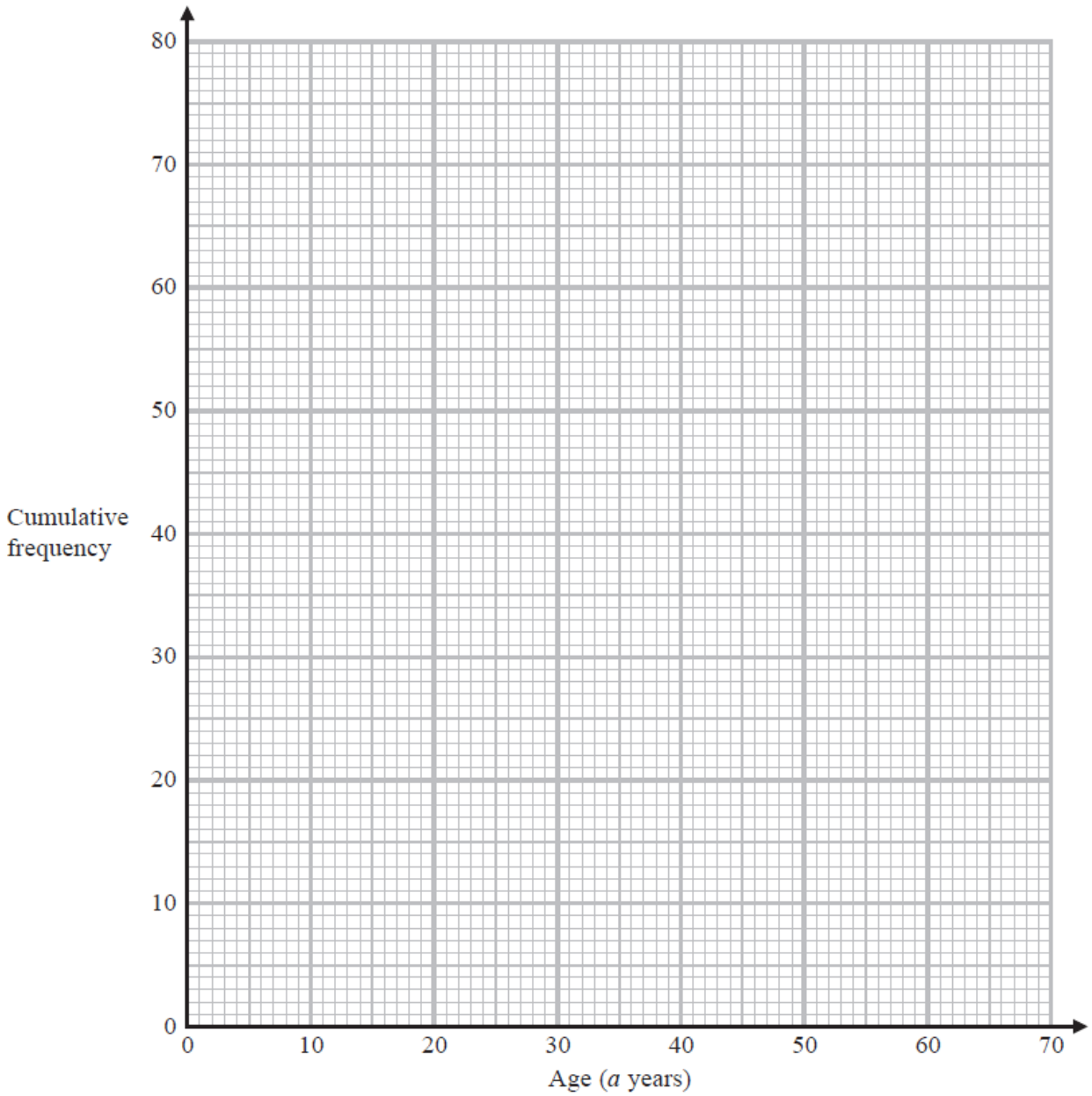
Age (a years)	**Frequency**
$0 < a \leq 20$	9
$20 < a \leq 30$	19
$30 < a \leq 40$	17
$40 < a \leq 50$	18
$50 < a \leq 60$	13
$60 < a \leq 70$	4

(a) Complete the cumulative frequency table.

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

(1)

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



(2)

(*c*) Use your graph to find an estimate for the median age of the people in the train carriage.

..... years

(2)

(Total for Question 7 is 5 marks)

8 Show that $3\frac{3}{4} \times \frac{7}{9} = 2\frac{11}{12}$

(Total for Question 8 is 3 marks)

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9 The length of a book is 33.8 cm, correct to one decimal place.

(*a*) Write down the lower bound of the length of the book.

..... cm
(1)

(*b*) Write down the upper bound of the length of the book.

..... cm
(1)

(Total for Question 9 is 2 marks)

10

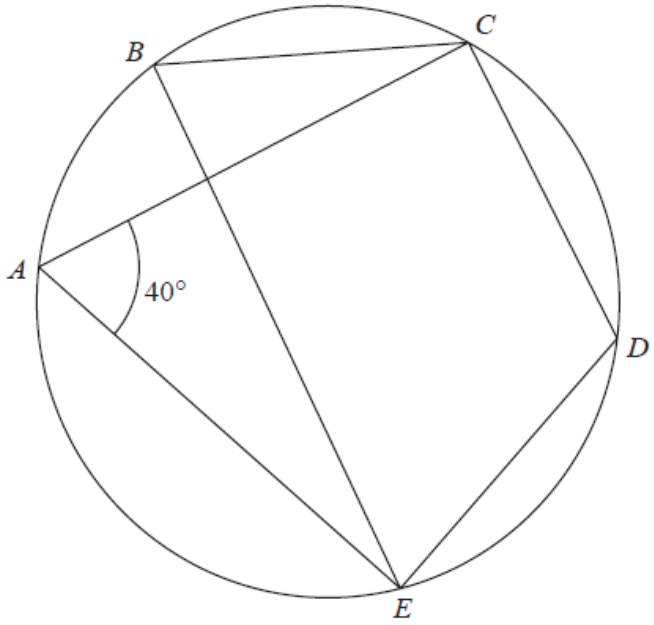


Diagram **NOT** accurately drawn

A, *B*, *C*, *D* and *E* are points on a circle.

Angle *EAC* = 40°

(*a*) (i) Write down the size of angle *EBC*.

.....°

(1)

(ii) Give a reason for your answer.

.....

(1)

(*b*) Find the size of angle *EDC*.

.....°

(1)

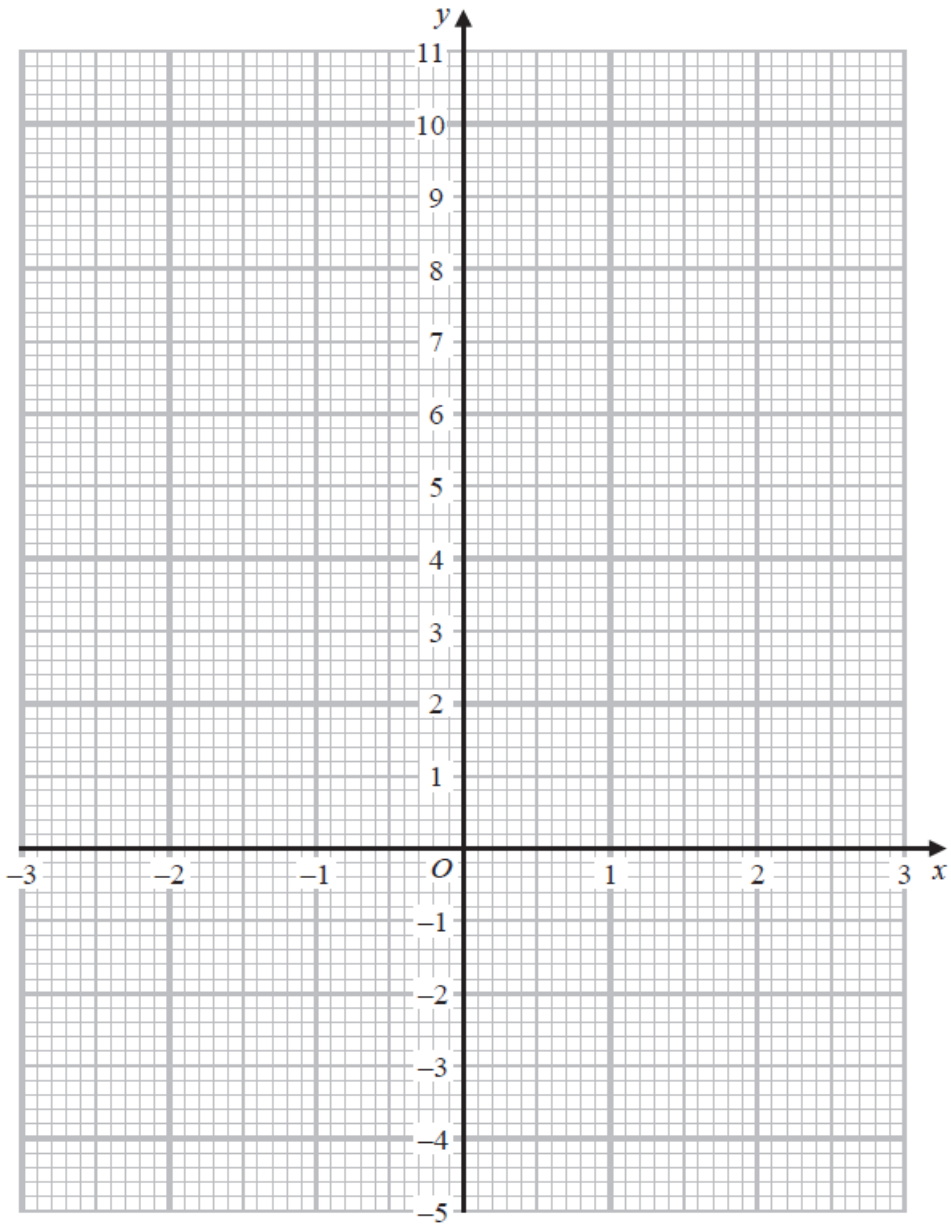
(Total for Question 10 is 3 marks)

11 (*a*) Complete the table of values for $y = \frac{1}{2}x^3 - 2x + 3$

x	–3	–2	–1	0	1	2	3
y	–4.5			3		3	

(2)

(*b*) On the grid, draw the graph of $y = \frac{1}{2}x^3 - 2x + 3$ for $-3 \leq x \leq 3$



(2)

(*c*) By drawing a suitable straight line on the grid, find an estimate for the solution of the equation $\frac{1}{2}x^3 - x + 4 = 0$

$x =$.....

(2)

(Total for Question 11 is 6 marks)

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12 Given that $n > 0$

make n the subject of the formula $y = \frac{n^2 + d}{n^2}$

.....

(Total for Question 12 is 4 marks)

---

13 T is inversely proportional to m^2

$T = 30$ when $m = 0.5$

(a) Find a formula for T in terms of m.

.....

(3)

(b) Work out the value of T when $m = 0.1$

.....

(1)

(Total for Question 13 is 4 marks)

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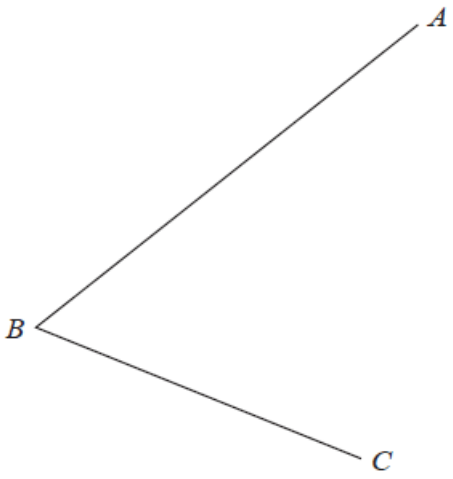
14 Using ruler and compasses only, construct the bisector of angle ABC.
You must show all your construction lines.



(Total for Question 14 is 2 marks)

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

.....

(Total for Question 15 is 4 marks)

16 The functions f and g are defined as

$$f(x) = 5x - 7 \quad \text{and} \quad g(x) = \frac{5x}{x+4}$$

(*a*) Find gf(2.6)

.....

(2)

(*b*) Solve $fg(x) = 2$

$x =$ .....

(3)

(*c*) Find the inverse function g^{-1}

$g^{-1} =$ .....

(3)

(Total for Question 16 is 8 marks)

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17 The curve with equation $x^2 - x + y^2 = 10$ and the straight line with equation $x - y = -4$ intersect at the points A and B.

Work out the exact length of AB.

Show your working clearly and give your answer in the for $\frac{\sqrt{a}}{2}$ where a is an integer.

.....

(Total for Question 17 is 6 marks)

18

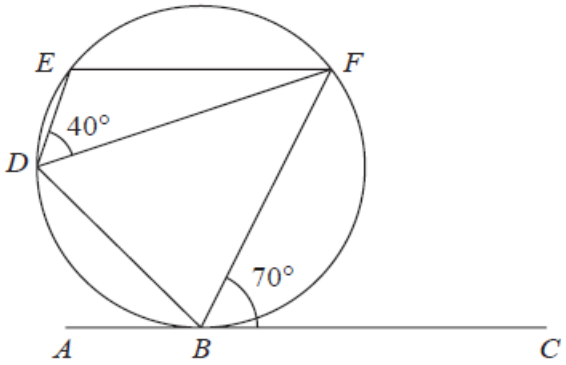

Diagram **NOT** accurately drawn

B, *D*, *E* and *F* are points on a circle.
ABC is the tangent to the circle at *B*.

Angle *EDF* = 40°
Angle *FBC* = 70°

Prove that the tangent *ABC* is parallel to *EF*.
Give a reason for each stage of your working.

(Total for Question 18 is 4 marks)

19

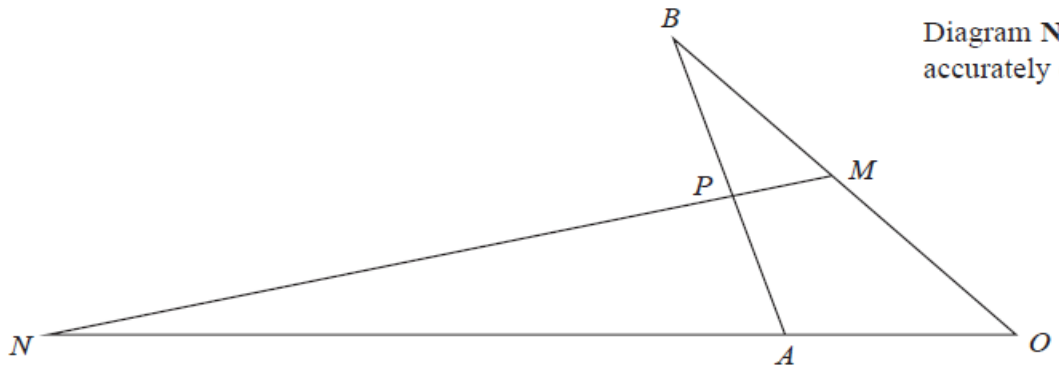

Diagram **NOT** accurately drawn

OAN, *OMB*, *APB* and *MPN* are straight lines.

$OA : AN = 1 : 4$

$OM : MB = 1 : 1$

$\overrightarrow{OA} = 2\mathbf{a}$ $\overrightarrow{OB} = 2\mathbf{b}$

By using a vector method, find the ratio $AP : PB$
Give your answer in its simplest form.

.....

(Total for Question 19 is 5 marks)

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21 Given that $M = \dfrac{18^{4n} \times 2^{3\left(n^2-6n\right)} \times 3^{2(1-4n)}}{12^2}$

find the values of n for which $M = 2$

.....

(Total for Question 21 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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