

# 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  $c = -5$

$G = \dots\dots\dots$

**(Total for Question 1 is 2 marks)**

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

Show clear algebraic working.

$x = \dots\dots\dots$

**(Total for Question 2 is 3 marks)**

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3 Given that  $150^x = 1$

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

$x = \dots\dots\dots$   
**(1)**

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

(b) find the value of  $n$ .

$n = \dots\dots\dots$   
**(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.

$x = \dots\dots\dots$

$y = \dots\dots\dots$

**(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.

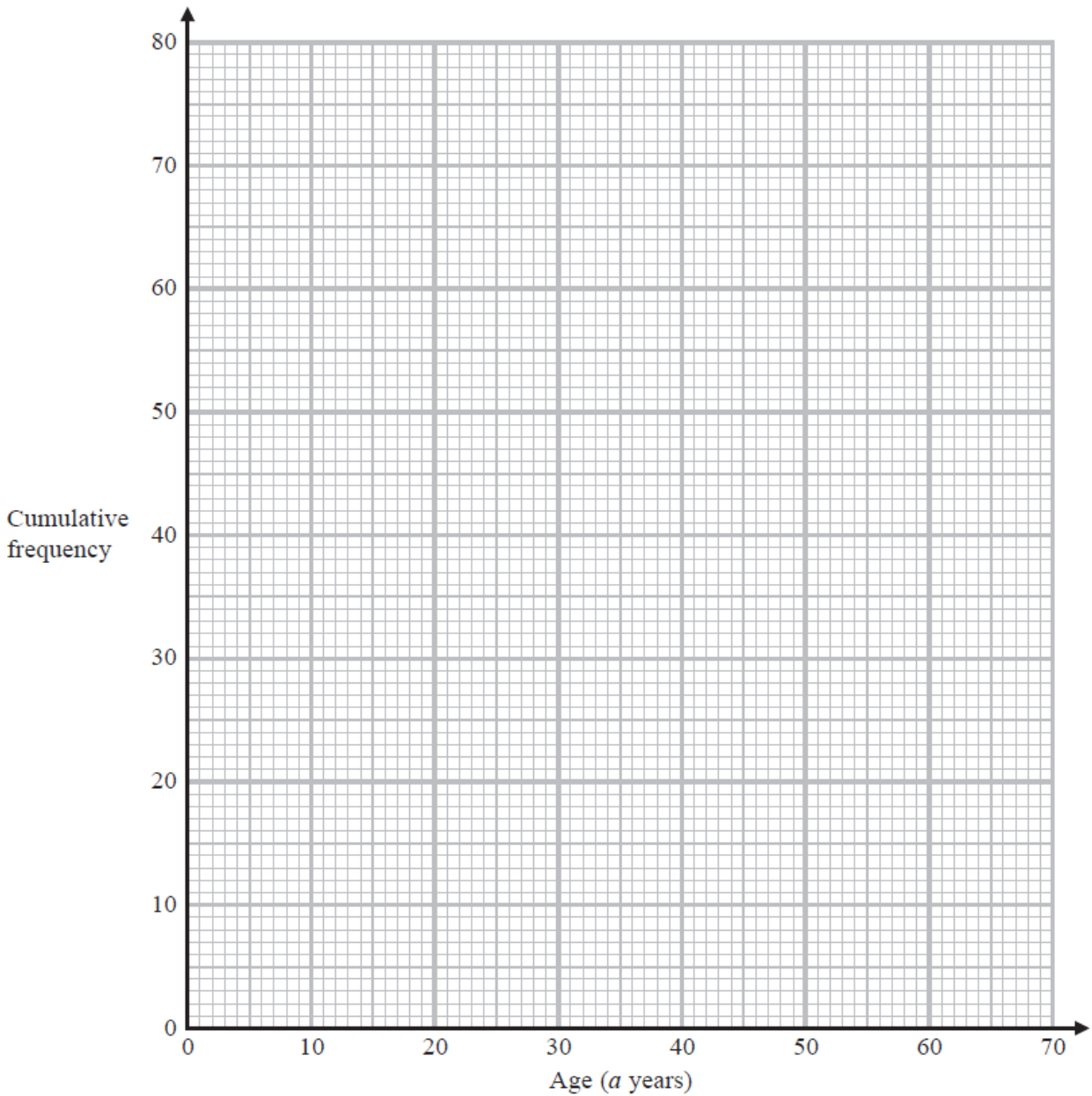
Age ( $a$ years)	Frequency
$0 < a \leq 20$	9
$20 < a \leq 30$	19
$30 < a \leq 40$	17
$40 < a \leq 50$	18
$50 < a \leq 60$	13
$60 < a \leq 70$	4

- (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)**

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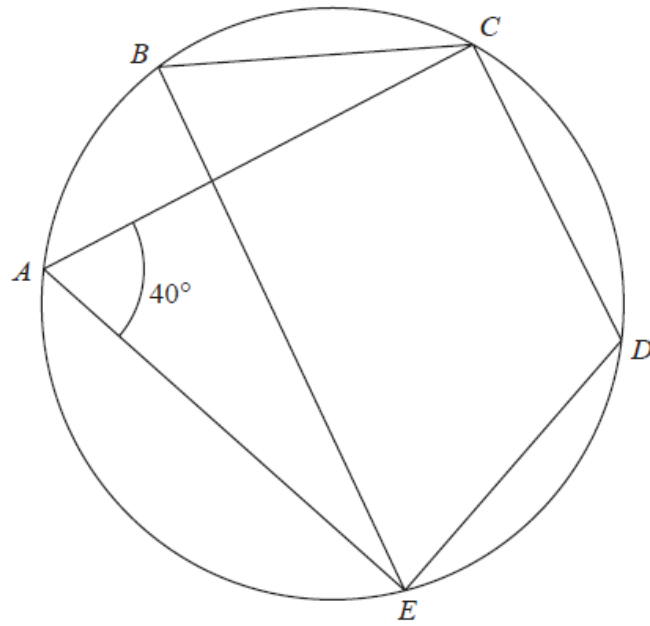


Diagram **NOT** accurately drawn

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

Angle  $EAC = 40^\circ$

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

.....<sup>o</sup>  
**(1)**

(ii) Give a reason for your answer.

.....  
**(1)**

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

.....<sup>o</sup>  
**(1)**

**(Total for Question 10 is 3 marks)**

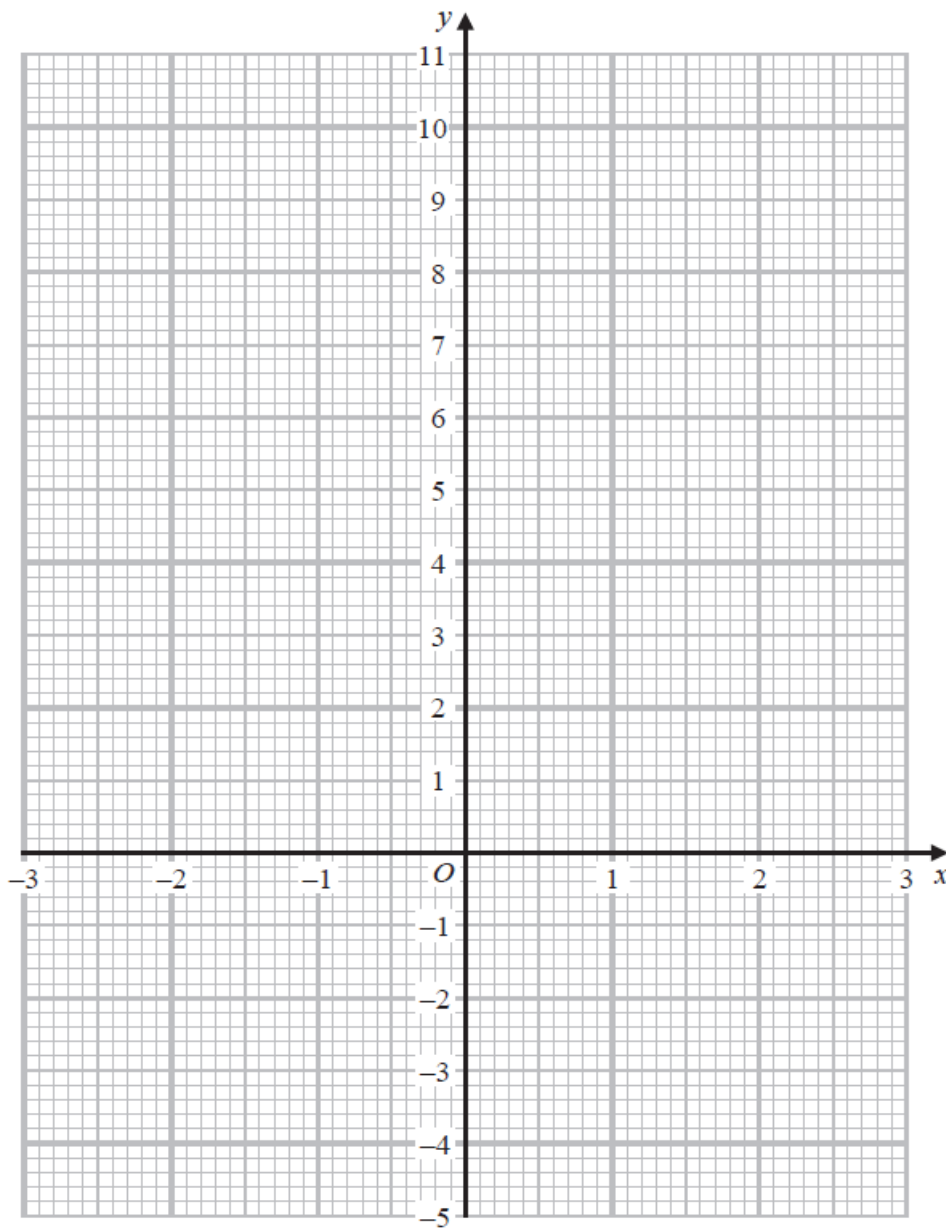


11 (a) Complete the table of values for  $y = \frac{1}{2}x^3 - 2x + 3$

$x$	-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  $\frac{1}{2}x^3 - x + 4 = 0$

$x = \dots\dots\dots$   
(2)

**(Total for Question 11 is 6 marks)**

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**12** Given that  $n > 0$

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

$\dots\dots\dots$   
(Total for Question 12 is 4 marks)

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**13**  $T$  is inversely proportional to  $m^2$

$$T = 30 \text{ when } m = 0.5$$

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

.....  
**(3)**

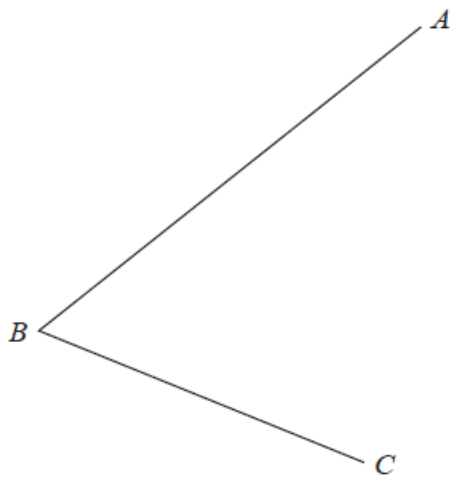
(b) Work out the value of  $T$  when  $m = 0.1$

.....  
**(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)**

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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 form  $\frac{\sqrt{a}}{2}$  where  $a$  is an integer.

.....  
**(Total for Question 17 is 6 marks)**

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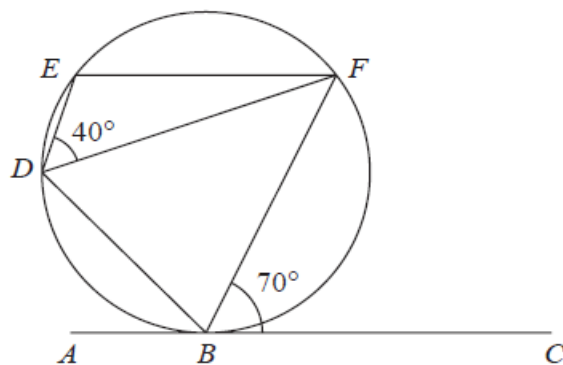


Diagram **NOT**  
accurately drawn

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

Angle  $EDF = 40^\circ$

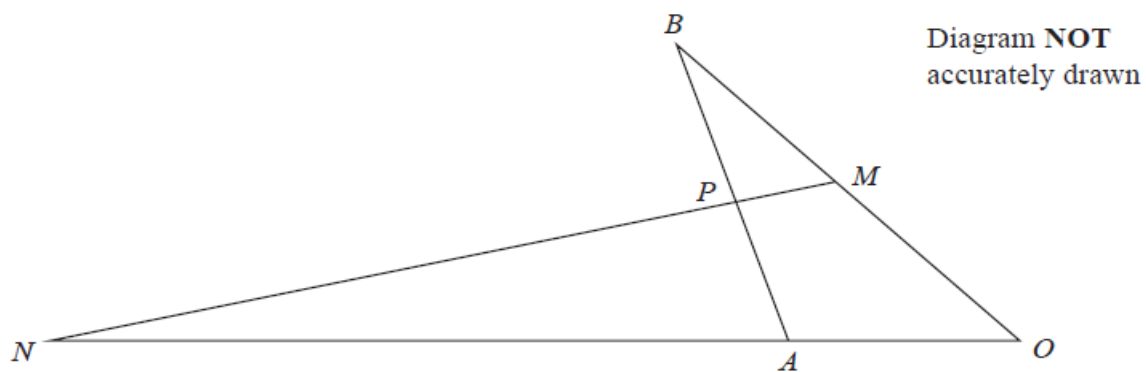
Angle  $FBC = 70^\circ$

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



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

$$OA : AN = 1 : 4$$

$$OM : MB = 1 : 1$$

$$\vec{OA} = 2\mathbf{a} \quad \vec{OB} = 2\mathbf{b}$$

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  $M = \frac{18^{4n} \times 2^{3(n^2-6n)} \times 3^{2(1-4n)}}{12^2}$

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

.....  
(Total for Question 21 is 5 marks)

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**TOTAL FOR PAPER IS 80 MARKS**

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