

# GCSE Mathematics

## Practice Tests: Set 8

### 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. 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 must not 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 TWENTY questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** (a) Write  $8 \times 10^4$  as an ordinary number.

.....  
(1)

(b) Work out  $(3.5 \times 10^5) \div (7 \times 10^8)$   
Give your answer in standard form.

.....  
(2)

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

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2 (a) Simplify  $y^5 \times y^9$

.....  
(1)

(b) Simplify  $(2m^3)^4$

.....  
(2)

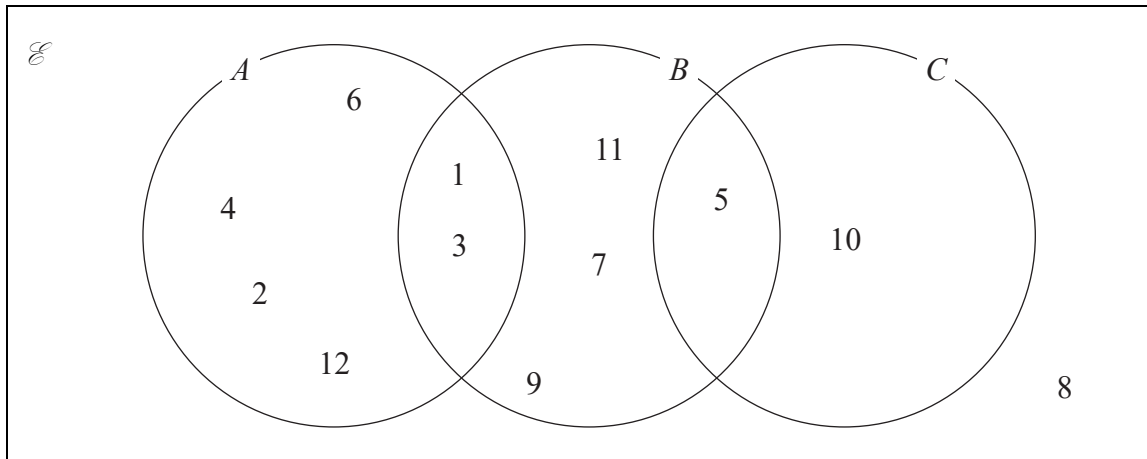
(c) Solve  $5(x + 3) = 3x - 4$   
Show clear algebraic working.

$x =$  .....  
(3)

**(Total for Question 2 is 6 marks)**

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3 Here is a Venn diagram.



Write down the numbers that are in the set

(i)  $A$

(ii)  $B \cup C$

.....

.....

(2)

(Total for Question 3 is 2 marks)

4 (a) Make  $a$  the subject of the formula  $M = ac - bd$

.....  
(2)

(b) Solve the inequality  $5x - 4 < 39$

.....  
(2)

(c) Factorise fully  $18e^2 f^3 - 12e^3 f$

.....  
(2)

**(Total for Question 4 is 6 marks)**

5 (a) Factorise  $x^2 + 2x - 24$

.....  
(2)

(b) Hence, solve  $x^2 + 2x - 24 = 0$

.....  
(1)

**(Total for Question 5 is 3 marks)**

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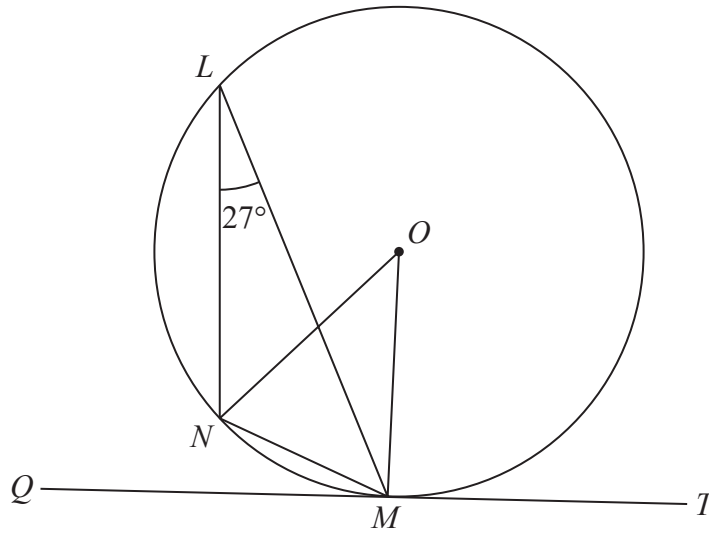


Diagram **NOT** accurately drawn

$L$ ,  $M$  and  $N$  are points on a circle, centre  $O$ .  
 $QMT$  is the tangent to the circle at  $M$ .

(a) (i) Find the size of angle  $NOM$ .

.....<sup>o</sup>

(ii) Give a reason for your answer.

.....  
 .....  
 ..... (2)

(b) (i) Find the size of angle  $NMQ$ .

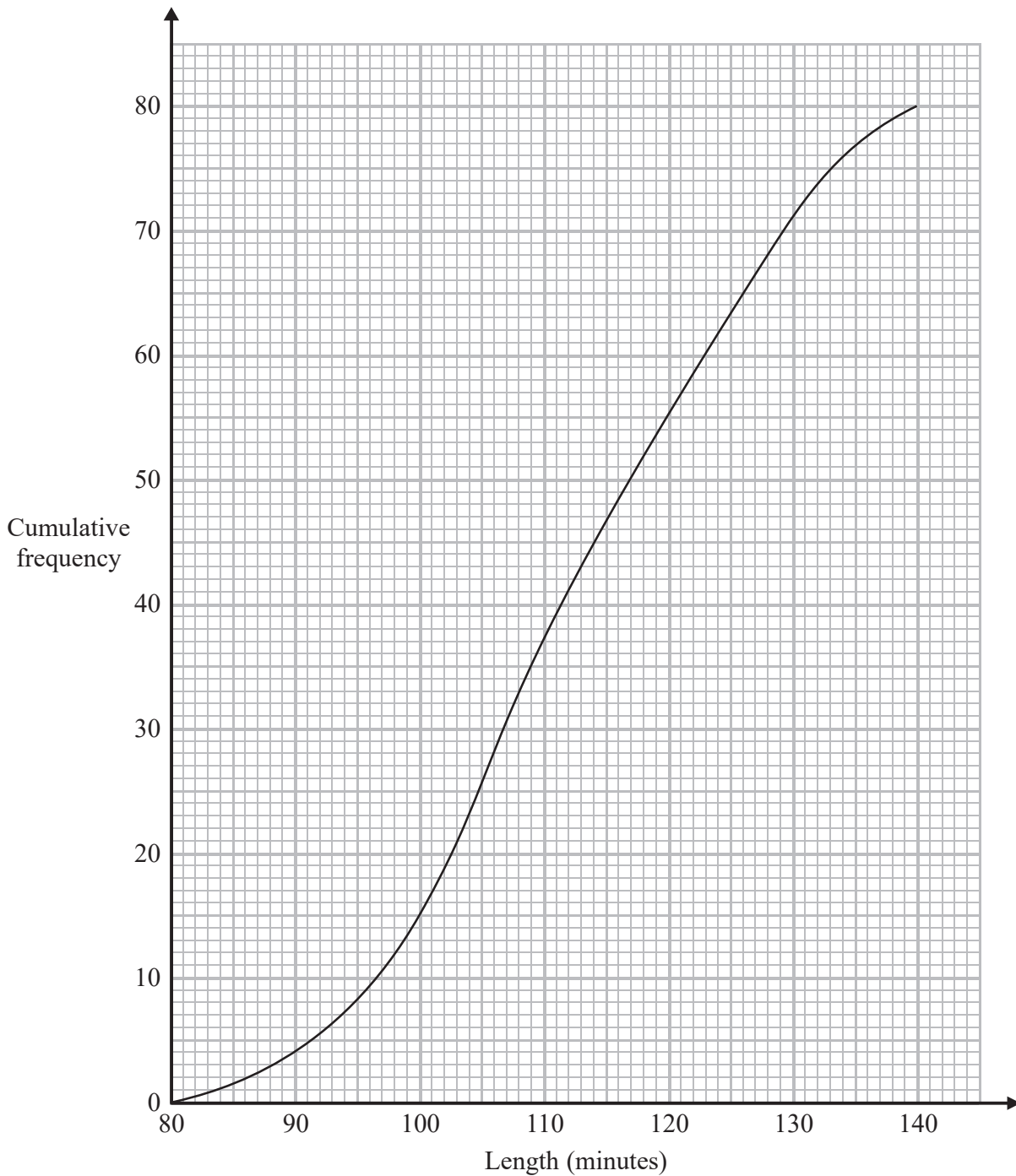
.....

(ii) Give a reason for your answer.

.....  
 .....  
 ..... (2)

**(Total for Question 6 is 4 marks)**

- 7 The cumulative frequency graph shows information about the length, in minutes, of each of 80 films.



(a) Use the graph to find an estimate for the interquartile range.

..... minutes  
(2)



Clare says,

“More than 35% of these films are over 120 minutes long.”

(b) Is Clare correct?

Give a reason for your answer.

.....

.....

**(3)**

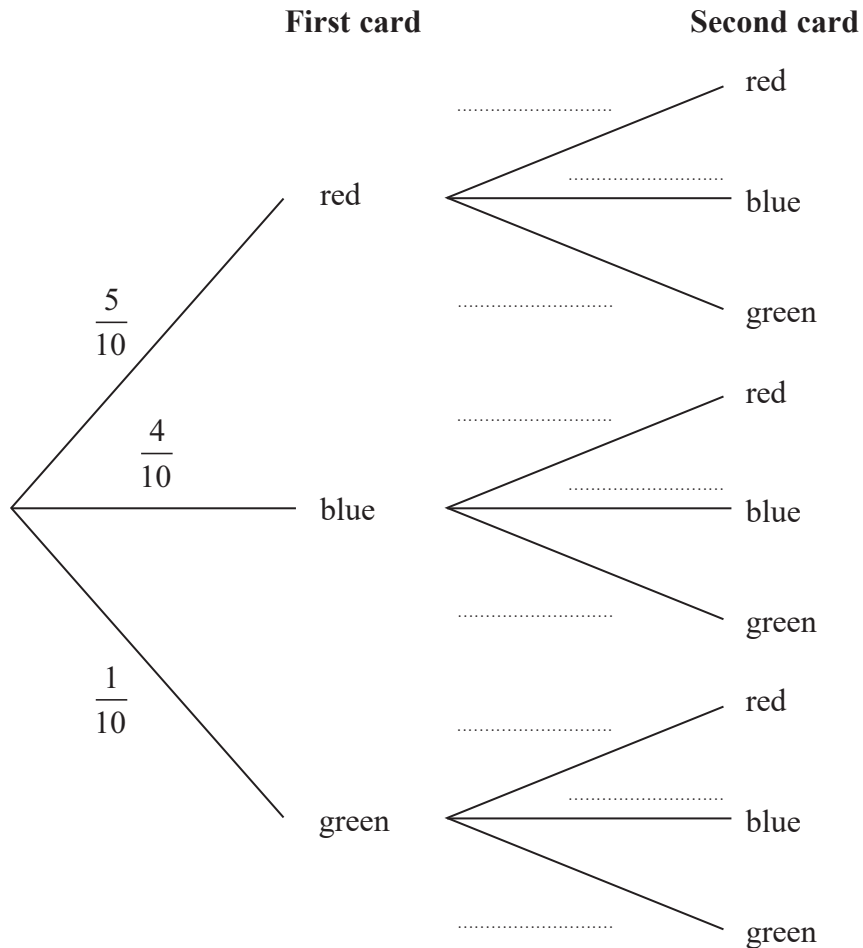
**(Total for Question 7 is 5 marks)**

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- 8 Felix has 10 cards.  
There are 5 red cards, 4 blue cards and 1 green card.

Felix takes at random one of the cards.  
He does not replace the card.  
Felix then takes at random a second card.

- (a) Complete the probability tree diagram.



(2)

- (b) Work out the probability that Felix takes at least one blue card and no green card.

.....  
(3)

**(Total for Question 8 is 5 marks)**

- 9 In the diagram below,  $P$  and  $Q$  are points on a circle with centre  $O$ .

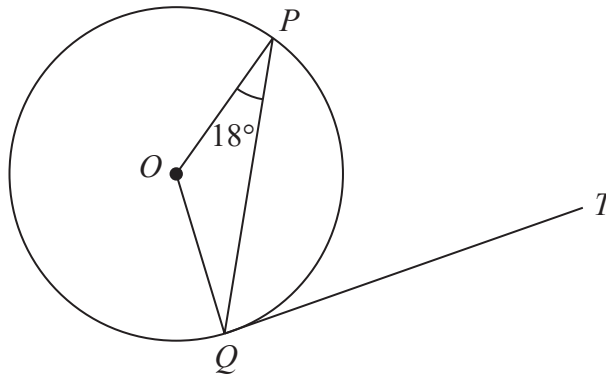


Diagram **NOT**  
accurately drawn

$QT$  is a tangent to the circle.

Angle  $OPQ = 18^\circ$

Work out the size of angle  $PQT$ .

Give a reason for each stage of your working.

.....<sup>o</sup>

**(Total for Question 9 is 3 marks)**

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10 The function  $f$  is such that

$$f(x) = \frac{3x-5}{4}$$

(a) Find  $f(-7)$

.....  
(1)

(b) Express the inverse function  $f^{-1}$  in the form  $f^{-1}(x) = \dots$

$f^{-1}(x) = \dots$   
(2)

The function  $g$  is such that

$$g(x) = \sqrt{19-x}$$

(c) Find  $fg(3)$

.....  
(2)

**(Total for Question 10 is 5 marks)**

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**11**  $\frac{8}{2^7} = 2^n$

(a) Find the value of  $n$ .

$n = \dots\dots\dots$   
(2)

$(13^{-6})^4 \times 13^5 = 13^k$

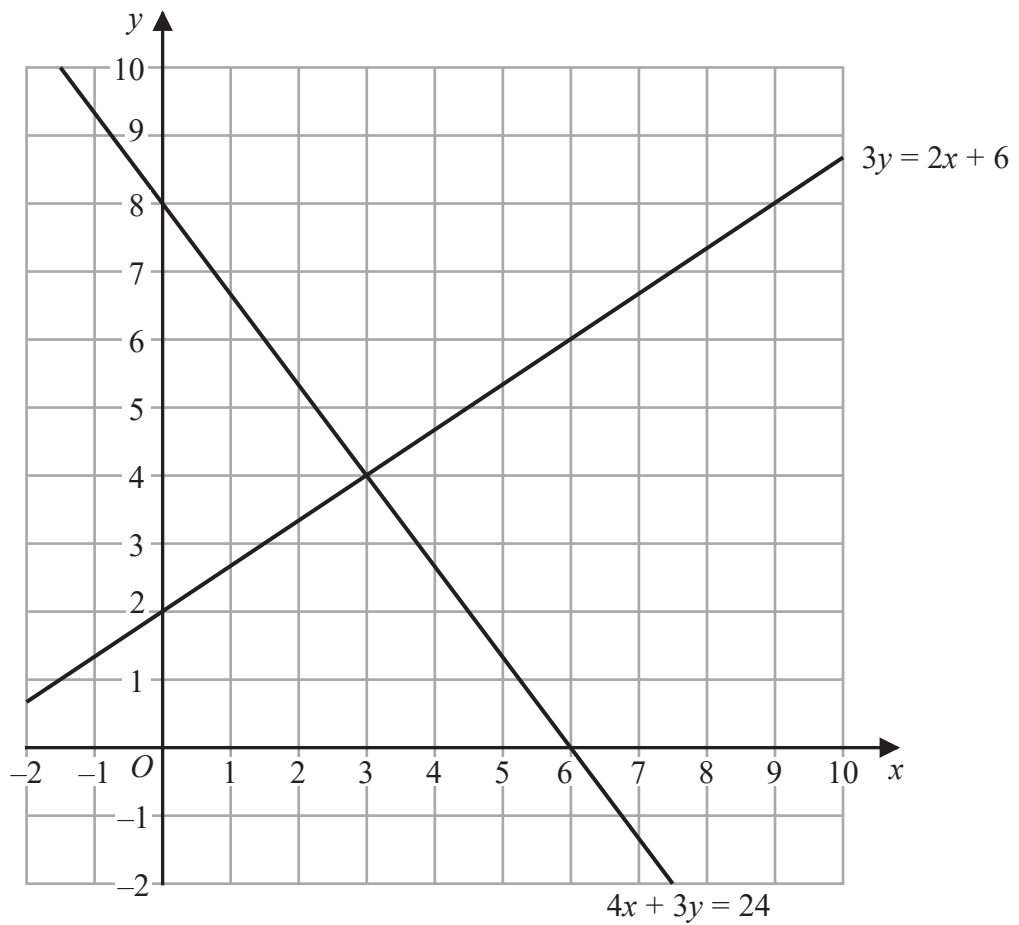
(b) Find the value of  $k$ .

$k = \dots\dots\dots$   
(2)

**(Total for Question 11 is 4 marks)**

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12 The diagram shows two straight lines drawn on a grid.



(a) Write down the solution of the simultaneous equations

$$\begin{aligned} 3y &= 2x + 6 \\ 4x + 3y &= 24 \end{aligned}$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(1)

(b) Show, by shading on the grid, the region defined by all five of the inequalities

$$x \geq 0 \quad y \geq 0 \quad x + y \geq 4 \quad 3y \leq 2x + 6 \quad 4x + 3y \leq 24$$

Label the region **R**.

(3)

(Total for Question 12 is 4 marks)

13 The diagram shows parallelogram  $ABCD$ .

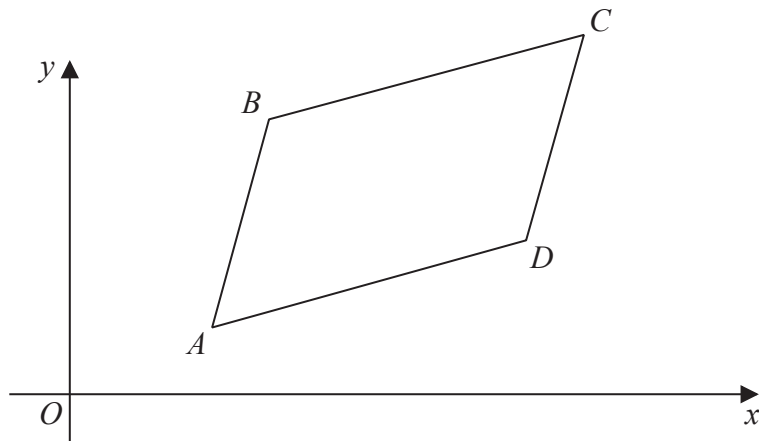


Diagram **NOT** accurately drawn

$$\vec{AB} = \begin{pmatrix} 2 \\ 7 \end{pmatrix} \quad \vec{AC} = \begin{pmatrix} 10 \\ 11 \end{pmatrix}$$

The point  $B$  has coordinates  $(5, 8)$

(a) Work out the coordinates of the point  $C$ .

(....., .....)  
(3)

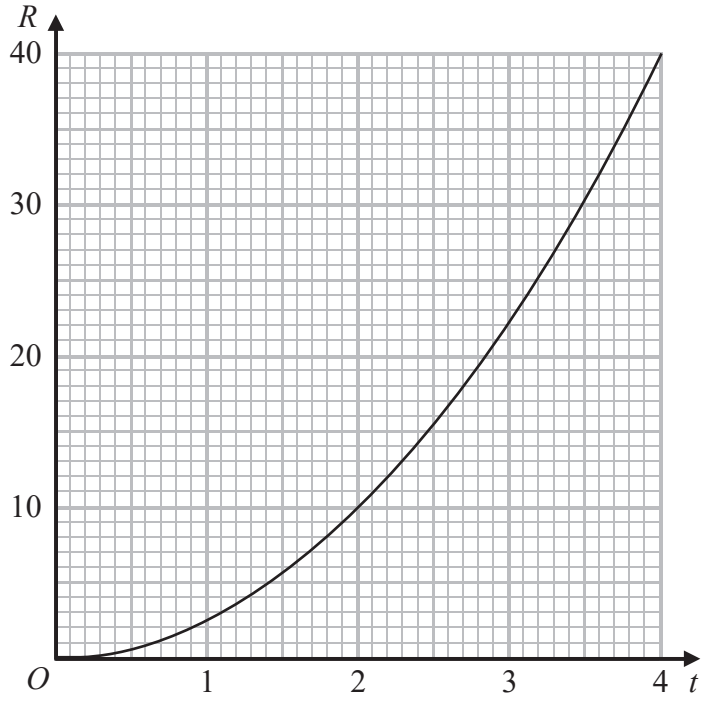
The point  $E$  has coordinates  $(63, 211)$

(b) Use a vector method to prove that  $ABE$  is a straight line.

(2)

**(Total for Question 13 is 5 marks)**

- 14  $R$  is proportional to  $t^2$   
The graph shows the relationship between  $R$  and  $t$  for  $0 \leq t \leq 4$



(a) Find a formula for  $R$  in terms of  $t$ .

.....  
(3)



Given also that  $R = \frac{8}{5x}$

(b) show that  $t$  is inversely proportional to  $\sqrt{x}$  for  $t > 0$

(2)

**(Total for Question 14 is 5 marks)**

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**15**  $A = 3^5 \times 5 \times 7^3$   
 $B = 2^3 \times 3 \times 7^4$

(a) (i) Find the Highest Common Factor (HCF) of  $A$  and  $B$ .

.....

(ii) Find the Lowest Common Multiple (LCM) of  $A$  and  $B$ .

.....

**(2)**

$A = 3^5 \times 5 \times 7^3$   
 $B = 2^3 \times 3 \times 7^4$   
 $C = 2^p \times 5^q \times 7^r$

Given that

the HCF of  $B$  and  $C$  is  $2^3 \times 7$

the LCM of  $A$  and  $C$  is  $2^4 \times 3^5 \times 5^2 \times 7^3$

(b) find the value of  $p$ , the value of  $q$  and the value of  $r$ .

$p =$  .....

$q =$  .....

$r =$  .....

**(2)**

**(Total for Question 15 is 4 marks)**

**16** Jack plays a game with two fair spinners, **A** and **B**.

Spinner **A** can land on the number 2 or 3 or 5 or 7.

Spinner **B** can land on the number 2 or 3 or 4 or 5 or 6.

Jack spins both spinners.

He wins the game if one spinner lands on an odd number **and** the other spinner lands on an even number.

Jack plays the game twice.

Work out the probability that Jack wins the game both times.

.....  
(Total for Question 16 is 4 marks)

17 Express  $\frac{1}{9x^2 - 25} - \frac{1}{6x + 10}$  as a single fraction in its simplest form.

.....  
(3)

**(Total for Question 17 is 3 marks)**

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18 (a) Show that  $\sqrt{45} + \sqrt{20} = 5\sqrt{5}$   
Show your working clearly.

(2)

(b) Express  $\frac{2}{\sqrt{3}-1}$  in the form  $p + \sqrt{q}$

where  $p$  and  $q$  are integers.  
Show your working clearly.

.....  
(2)

**(Total for Question 18 is 4 marks)**

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**19**  $ABC$  is an isosceles triangle such that

$$AB = AC$$

$A$  has coordinates  $(4, 37)$

$B$  and  $C$  lie on the line with equation  $3y = 2x + 12$

Find an equation of the line of symmetry of triangle  $ABC$ .

Give your answer in the form  $px + qy = r$  where  $p$ ,  $q$  and  $r$  are integers.

Show clear algebraic working.

.....  
(Total for Question 19 is 5 marks)

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**TOTAL FOR PAPER IS 80 MARKS**