Write your name here

Surname	Other names

Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

Paper 1R

Friday 10 May 2013 – Afternoon
Time: 1 hour 30 minutes

Paper Reference
4MB0/01R

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.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**

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.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ▶

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P 4 2 9 3 4 A 0 1 2 0

PEARSON

Answer ALL TWENTY SEVEN questions.

Write your answers in the spaces provided.

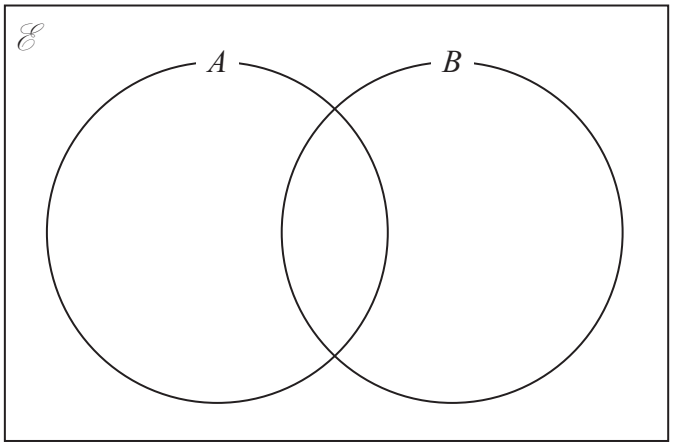
You must write down all stages in your working.

1 Simplify fully $3(3 - x) - 2(x - 4)$

.....

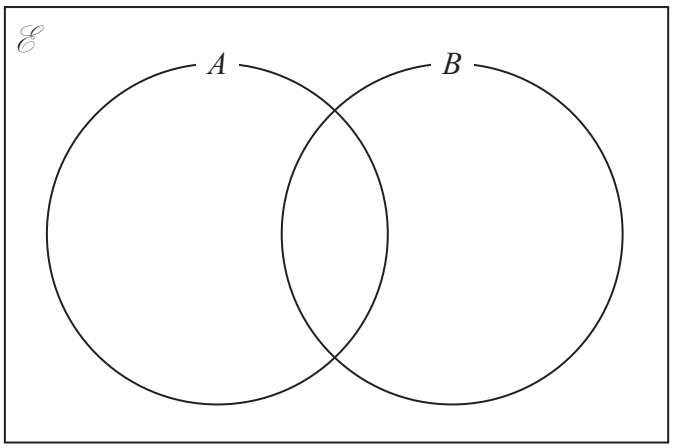
(Total for Question 1 is 2 marks)

2 (a) Shade $A \cap B$ on the Venn diagram below.



(1)

(b) Shade $A' \cup B$ on the Venn diagram below.

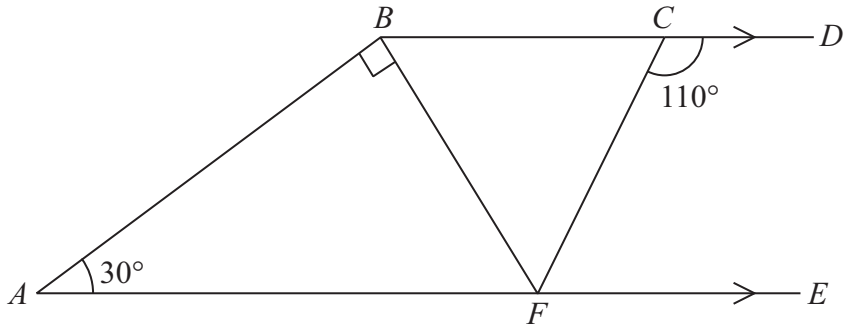


(1)

(Total for Question 2 is 2 marks)

3

Diagram **NOT** accurately drawn



In the diagram, the line BCD is parallel to the line AFE.

Given that $\angle DCF = 110°$, $\angle BAF = 30°$ and $\angle ABF$ is a right angle, find the size of $\angle BFC$.

$\angle BFC$ = ... °

(Total for Question 3 is 2 marks)

4 The nth term of a sequence is given by $1 - 2n$
Calculate the difference between the 4th term and the 5th term.

.....

(Total for Question 4 is 2 marks)

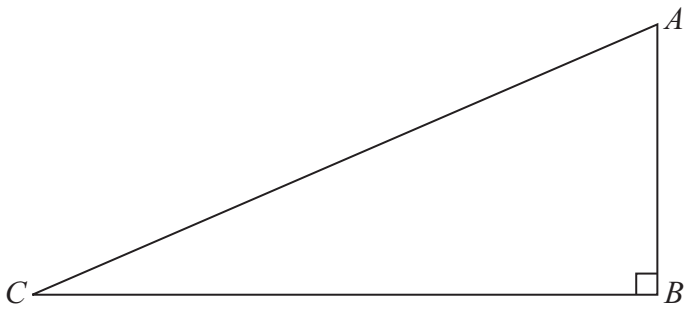
5 Find the gradient of the straight line $2x + 5y = 10$

gradient = ...

(Total for Question 5 is 2 marks)

6

Diagram **NOT** accurately drawn



AB is a vertical pole standing on horizontal ground *BC*.
The angle of elevation of *A*, the top of the pole, from *C* is 30°.

(a) Show this on the diagram by labelling the angle of elevation as 30°.

(1)

(b) Show on the diagram the angle of depression of *C* from *A*. Label this angle as *d*.

(1)

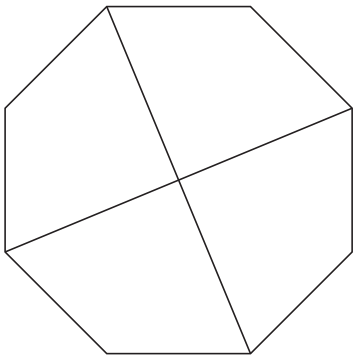
(Total for Question 6 is 2 marks)

7 In January, the cost of a litre of petrol was £1.20
In February, the cost of a litre of petrol was £1.35
Calculate the percentage increase in the cost of a litre of petrol.

.....%

(Total for Question 7 is 2 marks)

8



The diagram shows a regular octagon with two diagonals drawn.
Write down

(a) the number of lines of symmetry of the diagram,

.....

(1)

(b) the order of rotational symmetry of the diagram.

.....

(1)

(Total for Question 8 is 2 marks)

9 Express a speed of 9 m/s in km/h.

..... km/h

(Total for Question 9 is 3 marks)

10 Given that $N = 32\,145.65$

write N

(a) in standard form,

.....

(1)

(b) to 1 decimal place,

.....

(1)

(c) to 3 significant figures.

.....

(1)

(Total for Question 10 is 3 marks)

11 A bag contains 15 red balls and 20 black balls.
Balls are to be taken out of the bag at random, one at a time and not replaced.
Find the probability that

(a) the first ball taken out of the bag is red,

.....

(1)

(b) the first two balls taken out of the bag are both red.

.....

(2)

(Total for Question 11 is 3 marks)

12 Solve $3^{3x-5} = 9^{x}$

$x =$ .....

(Total for Question 12 is 3 marks)

13

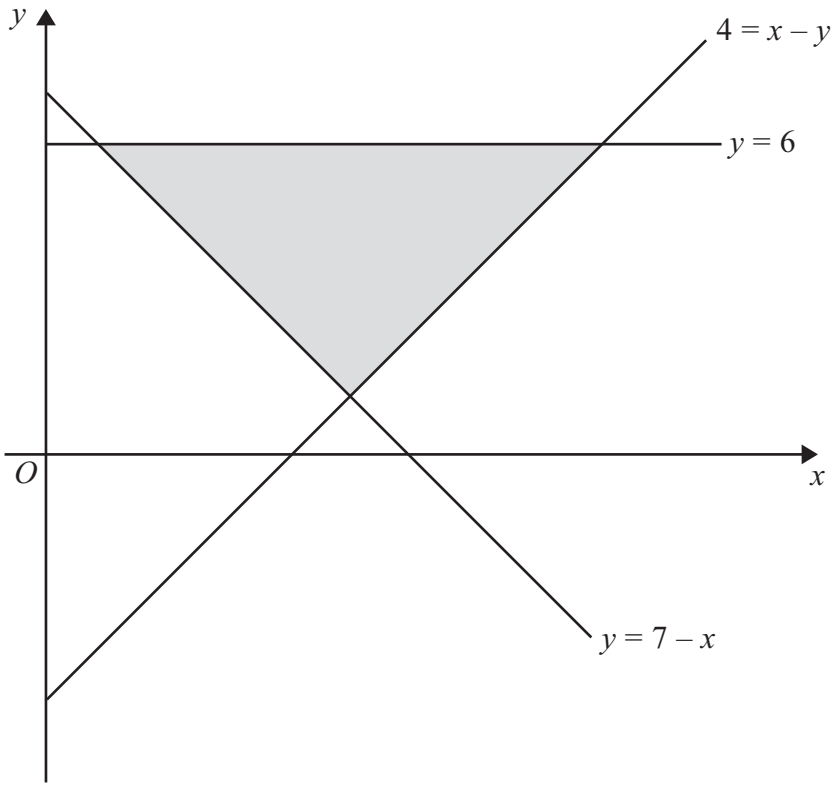


Diagram **NOT** accurately drawn

Write down the three inequalities which define the shaded region in the above diagram.

.....

.....

.....

(Total for Question 13 is 3 marks)

14 Find the Lowest Common Multiple (LCM) and the Highest Common Factor (HCF) of 18, 42 and 420

LCM = ...

HCF = ...

(Total for Question 14 is 3 marks)

15 Here are the marks of 12 students in a test

20, 29, 22, 28, 22, 27, 22, 26, 24, 25, 24, 25

(a) Write down the mode.

.....

(1)

(b) Calculate the mean mark.

.....

(2)

(Total for Question 15 is 3 marks)

16 Given that c is positive, make c the subject of $a = \sqrt{1 - \frac{b^2}{c^2}}$

$c =$ .....

(Total for Question 16 is 4 marks)

17

$\mathscr{E} = \{2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9,\ 10,\ 11,\ 12,\ 13,\ 14,\ 15\}$,

$A = \{x : 8 \leqslant x \leqslant 14\}$,

$B = \{x : x \text{ is odd}\}$,

$C = \{x : x \text{ is a multiple of } 3\}$.

List the elements of the set

(a) C

.....

(1)

(b) $A \cap C$

.....

(1)

(c) $B \cap C'$

.....

(1)

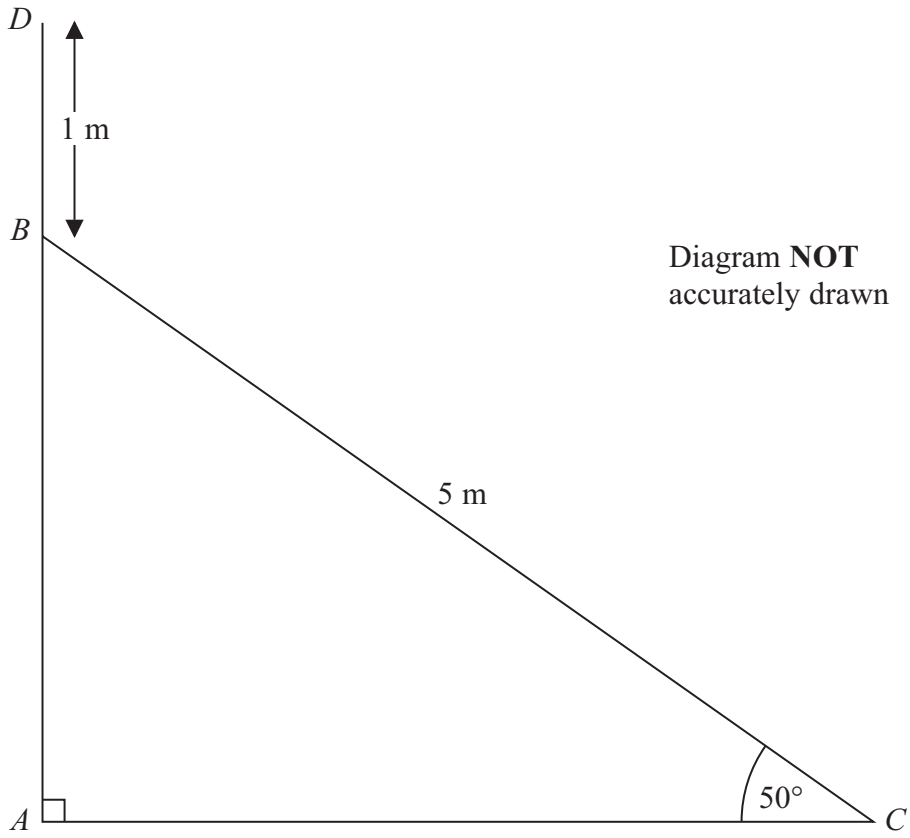
(d) $(A \cup B \cup C)'$

.....

(1)

(Total for Question 17 is 4 marks)

18



The figure shows a ladder of fixed length 5 m with its lower end at the point C on horizontal ground AC. The upper end of the ladder rests against the point B of a vertical wall ABD. The ladder makes an angle of 50° with the ground.

For safety reasons, both ends of the ladder are moved so that the upper end of the ladder is moved 1 m up from the point B to the point D on the wall.

Calculate the size of the angle, to the nearest degree, that the ladder now makes with the ground.

.....°

(Total for Question 18 is 4 marks)

19 $\mathbf{C} = \begin{pmatrix} 5 & 9 \\ 6 & 10 \end{pmatrix}$

(a) Calculate the determinant of **C**

.....

(2)

$$\mathbf{A} = \begin{pmatrix} -1 & 2 \\ 5 & -3 \end{pmatrix}, \qquad \mathbf{B} = \begin{pmatrix} 3 & 6 \\ -1 & 1 \end{pmatrix}$$

(b) Calculate **AB**

$$\mathbf{AB} = \begin{pmatrix} & \\ & \end{pmatrix}$$

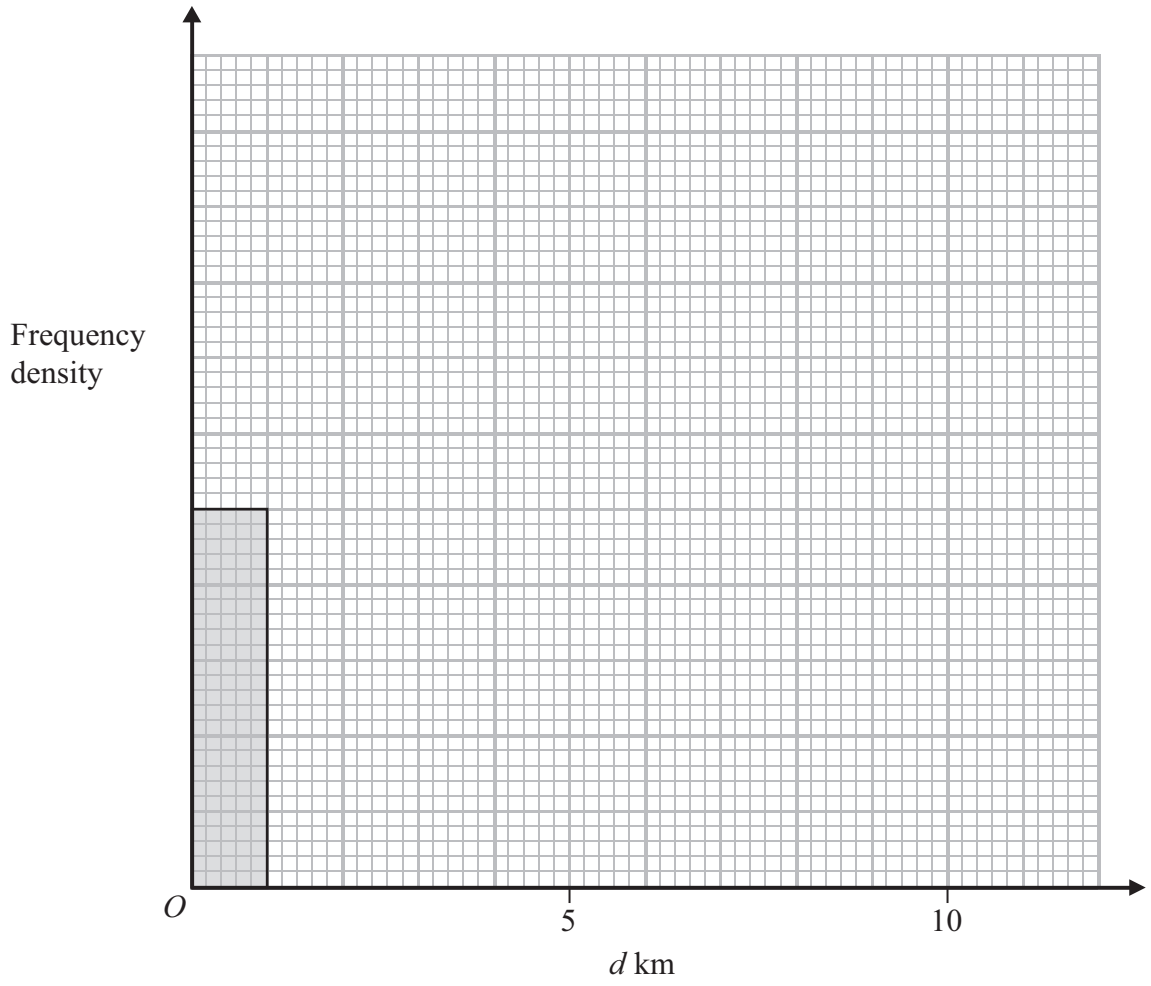
(2)

(Total for Question 19 is 4 marks)

20 The table below gives information about the distances travelled by a delivery van and the numbers of deliveries in one day.

Distance travelled (d km)	**Number of deliveries**
$0 < d \leqslant 1$	5
$1 < d \leqslant 1.5$	3
$1.5 < d \leqslant 2.5$	4
$2.5 < d \leqslant 6$	28
$6 < d \leqslant 11$	20

On the graph paper complete the histogram to represent this information.
Show the scale on the frequency density axis of your histogram.



(Total for Question 20 is 4 marks)

21

$\overrightarrow{OA} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\overrightarrow{OB} = \begin{pmatrix} 6 \\ 5 \end{pmatrix}$

(a) Write down the vector $\overrightarrow{AB}$

$\overrightarrow{AB} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$

(1)

(b) Calculate the modulus of $\overrightarrow{AB}$

.....

(2)

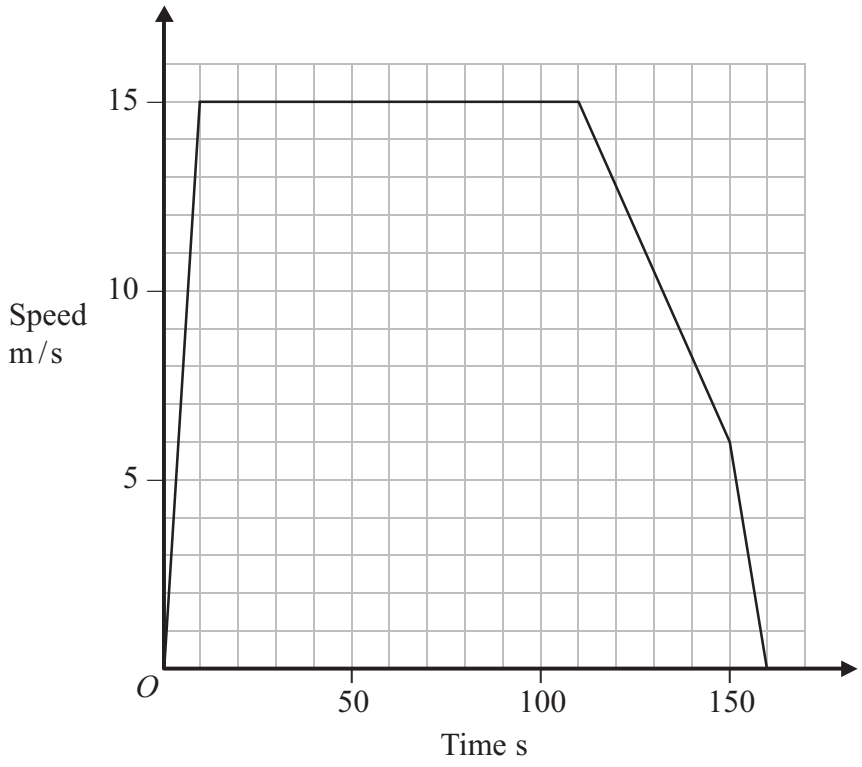
(c) Calculate the size, to the nearest degree, of the angle between the vector $\overrightarrow{AB}$ and the positive direction of the x-axis.

.....°

(2)

(Total for Question 21 is 5 marks)

22



The diagram shows the speed-time graph for a car over a period of 160 seconds (s).

(a) Describe **fully** what the graph shows about the motion of the car between 110 s and 150 s.

.....

.....

.....

(2)

Find

(b) the total distance, in metres (m), moved by the car in the 160 s period,

..... m

(3)

(c) the average speed, in m/s to 3 significant figures, of the car for the 160 s period.

..... m/s

(1)

(Total for Question 22 is 6 marks)

23 A sector of a circle has an angle of 60°. The area of the sector is 50 m^2.
Calculate, to 3 significant figures,

(a) the radius, in m, of the sector,

..... m

(3)

(b) the perimeter, in m, of the sector.

..... m

(3)

(Total for Question 23 is 6 marks)

24

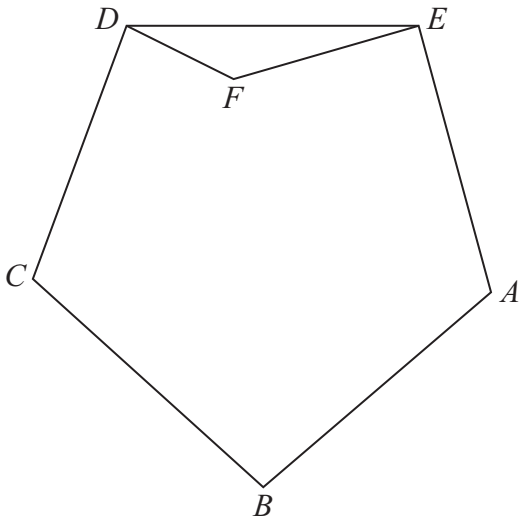


Diagram **NOT** accurately drawn

ABCDE is a regular pentagon.

(a) Calculate the size, in degrees, of an interior angle of the pentagon.

.....°

(2)

The point *F* lies inside the pentagon such that $\angle CDF = 70°$ and $\angle FEA = 85°$

(b) Calculate the size, in degrees, of the **reflex** angle, $\angle DFE$.

.....°

(4)

(Total for Question 24 is 6 marks)

25 Given that $f(x) = 2x^3 - 17x^2 - 58x + 33$

(a) show that $f(11) = 0$

(2)

(b) hence fully factorise $f(x)$.

.....

(4)

(Total for Question 25 is 6 marks)

26

Question 26 continued

A boat is at the point B in the diagram.

A port P is 9 km from B and on a bearing of 075° from B.
A lighthouse L is 5 km due south of P.

Using a scale of 1 cm to represent 2 km,

(a) find the position on the diagram of the port and label it P,

(1)

(b) find the position on the diagram of the lighthouse and label it L.

(1)

(c) Find by measurement the bearing of B from L.

..... °

(1)

The boat at B moves from B at 0700 and travels at a constant speed of 8 km/h on a bearing of 160°. At 0845 the boat is at the point T.

(d) Calculate the distance, in km, of T from B.

..... km

(2)

(e) Using the same scale, find and label the position of T on the diagram.

(1)

(f) Find by measurement the distance, in km, of T from L.

..... km

(1)

(Total for Question 26 is 7 marks)

27

$$f : x \mapsto 4x - 2$$

$$g : x \mapsto \frac{1}{x - 1}$$

(a) Write down the value of x which **must** be excluded from the domain of g.

.....

(1)

(b) Show that $g^{-1} : x \mapsto \frac{1 + x}{x}$

(2)

(c) Solve $f(x) = g^{-1}(x)$

.....

(4)

(Total for Question 27 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS