

12

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

A box, in the shape of a cuboid, is going to be put on a table.

The whole of one face of the box will be in contact with the table.

The force exerted by the box on the table is always 105 newtons.

The box is 5 m by 4 m by 3 m.

The greatest pressure exerted by the box on the table is  $P$  newtons/m<sup>2</sup>

The least pressure exerted by the box on the table is  $Q$  newtons/m<sup>2</sup>

Work out the value of  $P - Q$

.....  
(Total for Question 12 is 3 marks)

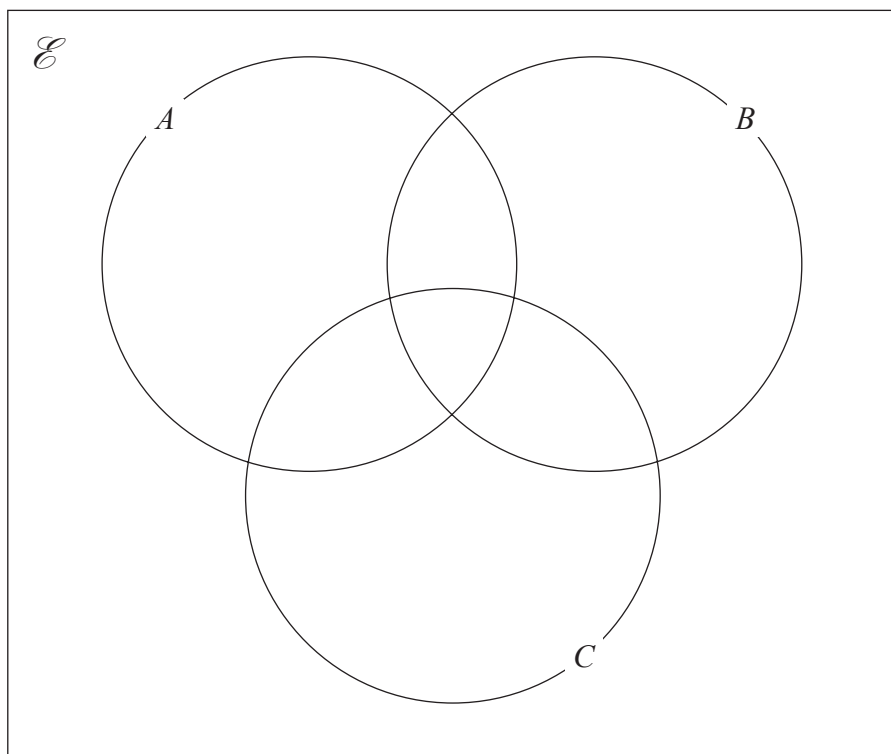
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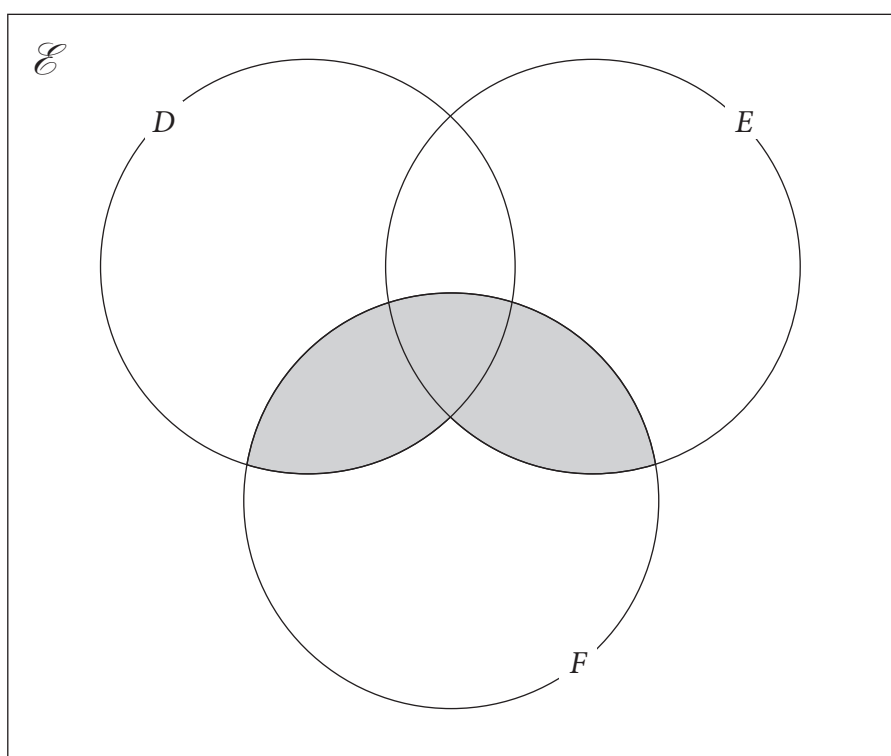


13 (a) On the Venn diagram, shade the set  $(A \cup B)' \cap C$



(1)

(b) Use set notation to describe the shaded region in the Venn diagram below.



(1)

(Total for Question 13 is 2 marks)



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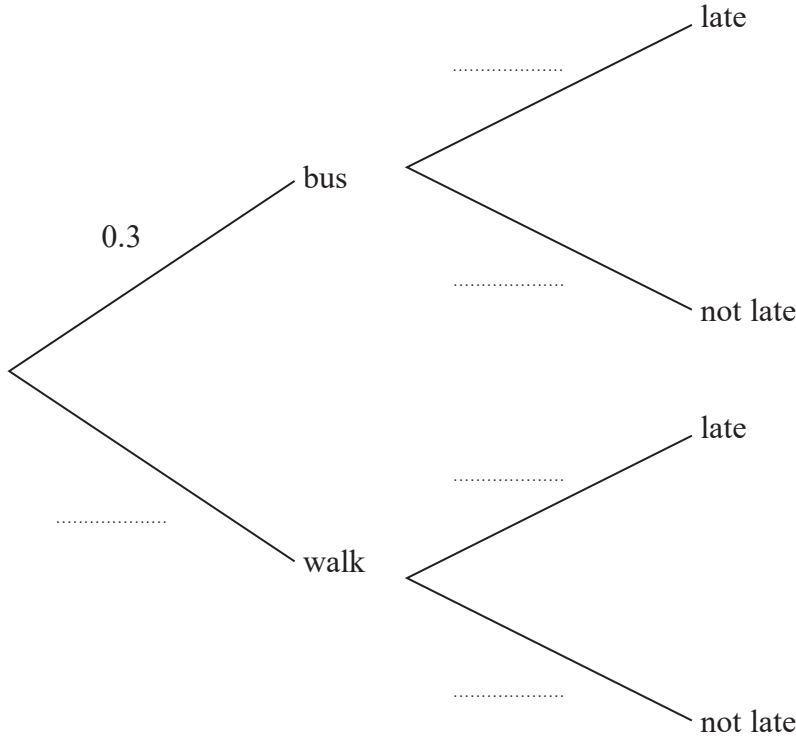
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14 Each day that Barney goes to college, he either goes by bus or he walks.  
The probability that Barney will go to college by bus on any day is 0.3

When Barney goes to college by bus, the probability that he will be late is 0.2  
When Barney walks to college, the probability that he will be late is 0.1

(a) Complete the probability tree diagram.



(2)

Barney will go to college on 200 days next year.

(b) Work out an estimate for the number of days Barney will be late for college next year.

.....  
(4)

(Total for Question 14 is 6 marks)



15 The straight line  $L_1$  has equation  $2y = 6x - 5$

The straight line  $L_2$  is perpendicular to  $L_1$  and passes through the point  $(9, -1)$

Find an equation for  $L_2$

Give your answer in the form  $ay + bx = c$

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

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16 A particle  $P$  is moving along a straight line.  
The fixed point  $O$  lies on this line.

At time  $t$  seconds, the displacement,  $s$  metres, of  $P$  from  $O$  is given by

$$s = 4t^3 - 6t^2 + 5t$$

At time  $t$  seconds, the velocity of  $P$  is  $v$  m/s.

(a) Find an expression for  $v$  in terms of  $t$ .

$v = \dots\dots\dots$   
(2)

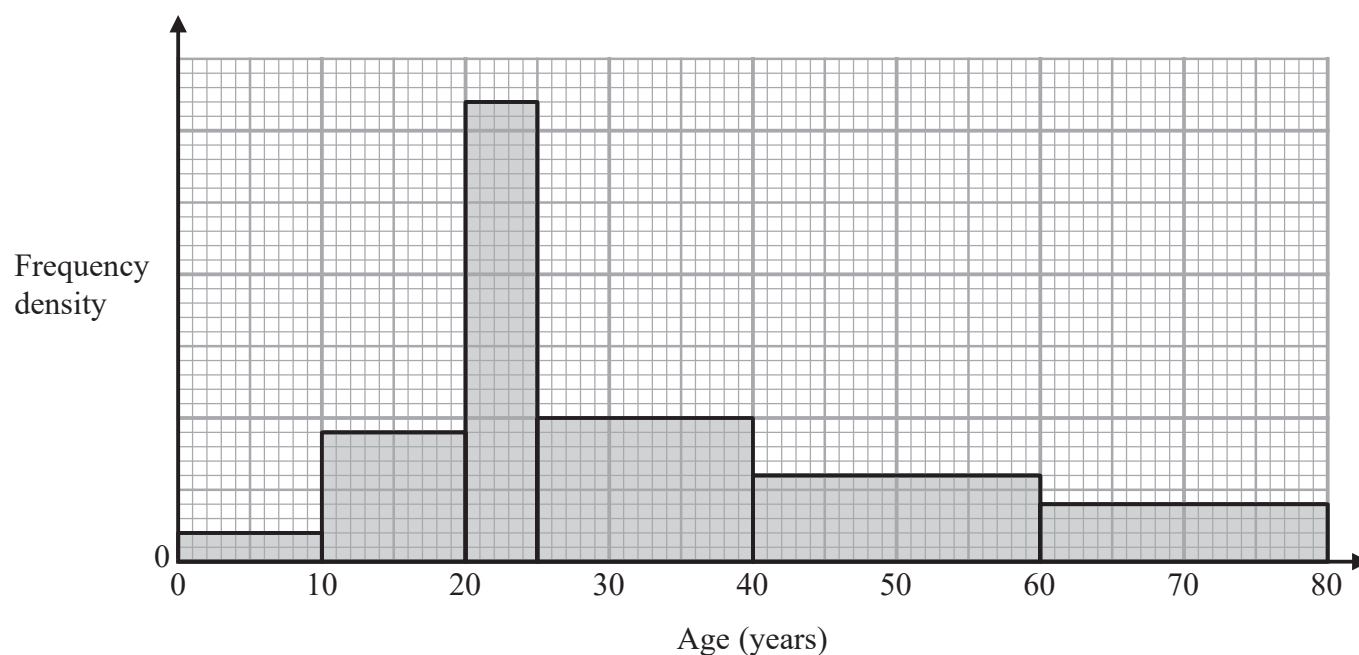
(b) Find the time at which the acceleration of the particle is  $6 \text{ m/s}^2$

$\dots\dots\dots$  seconds  
(3)

(Total for Question 16 is 5 marks)



17 The histogram shows information about the ages of all the passengers travelling on a plane. No one on the plane is older than 80 years.



24 passengers on the plane are aged between 40 years and 60 years.

(a) Work out the total number of passengers on the plane.

.....  
(3)

A passenger on the plane is picked at random.

(b) Work out an estimate for the probability that this person is older than 55 years.

.....  
(2)

**(Total for Question 17 is 5 marks)**



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18 (a) Expand and simplify  $(x + 2)(2x + 3)(x - 7)$   
Show your working clearly.

.....  
(3)

(b) Make  $m$  the subject of  $p^2 = \frac{x + m}{2m - y}$

.....  
(3)

(Total for Question 18 is 6 marks)

