

Revision F4 (All topics) B [56]

1.

The volume, V cubic metres, of a hot-air balloon is proportional to the cube of its height, h metres. A balloon with a height of 10 metres has a volume of 500 cubic metres.

(a) Find an equation connecting V and h . (3)

(b) Find the volume of a hot-air balloon which has a height of 30 metres. (1)

(c) Another hot-air balloon has a volume of 5000 cubic metres.

Find its height.

(3)
(Total 7 marks)

2.

(a) Expand and simplify $7(x - 2y) - 3(2x - y)$ (2)

(b) Simplify

(i) $w^2 \times w^6$ (1)

(ii) $w^{10} \div w^4$ (1)

(iii) $(w^4)^3$ (1)

(c) (i) Factorise $y^2 - 5y + 6$ (2)

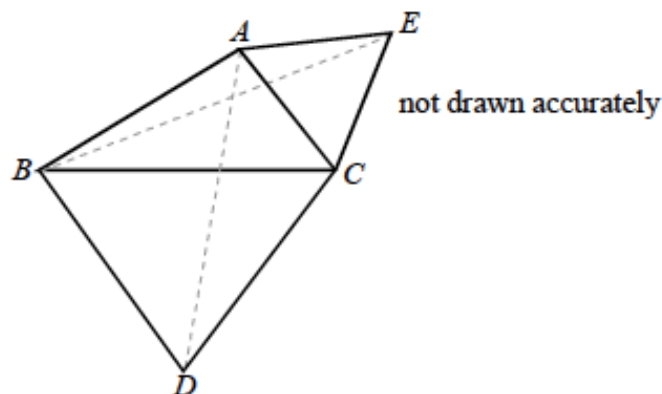
(ii) Hence solve the equation $y^2 - 5y + 6 = 0$ (1)

(Total 8 marks)

3.

Triangle ABC is scalene.

Triangles BCD and ACE are equilateral.



Prove that triangles ADC and EBC are congruent.

(Total 4 marks)

4.

- (a) An ordinary six-sided dice is biased.
The probabilities of the dice landing on each of the numbers are

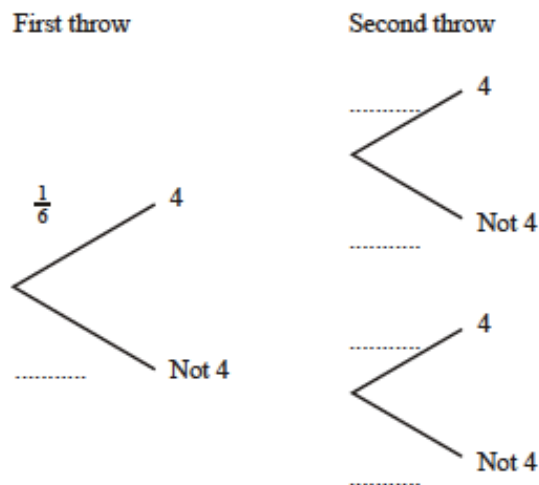
Number	1	2	3	4	5	6
Probability	p	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{2}{9}$

Work out the value of p .

(2)

- (b) The dice is thrown twice.

- (i) Complete the tree diagram.



(2)

- (ii) Calculate the probability that only one 4 is thrown.

(3)

(Total 7 marks)

5.

The table shows the distribution of ages in a health club.

Age, y (years)	Frequency
$0 < y \leq 15$	75
$15 < y \leq 20$	350
$20 < y \leq 25$	850
$25 < y \leq 40$	750
$40 < y \leq 70$	600

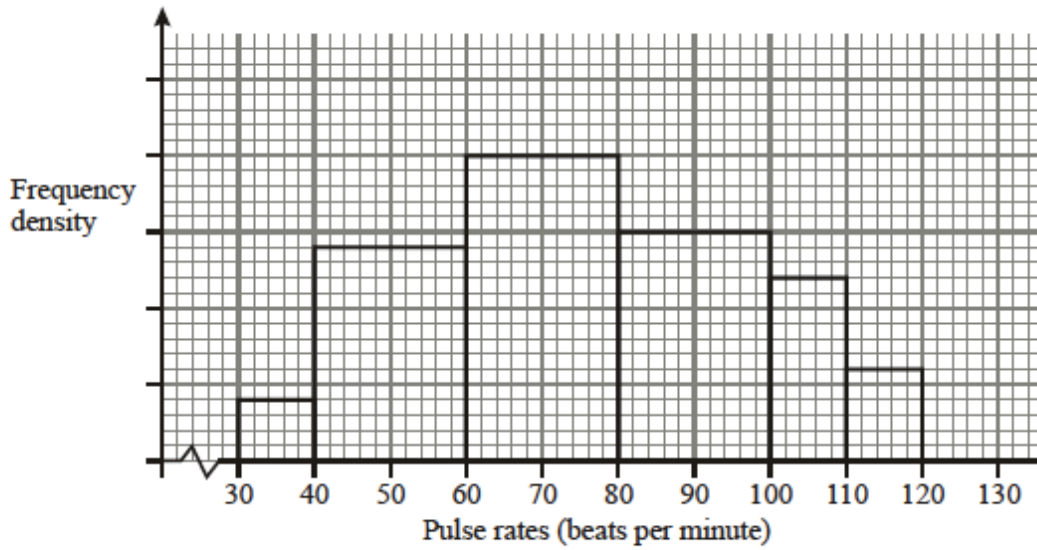
- (a) (i) Draw a histogram to illustrate this data.

(3)

- (ii) Members over 65 pay a reduced subscription. Estimate how many members are over 65.

(1)

(b) This histogram shows the pulse rates of some of the members of the club.

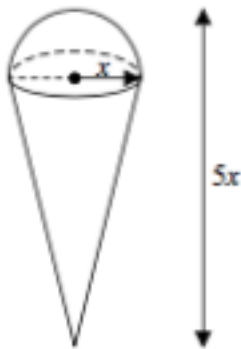


60 of the members have a pulse rate lower than 50 beats per minute.
How many members have a pulse rate greater than 90 beats per minute?


(4)
(Total 8 marks)

6. Non-calculator

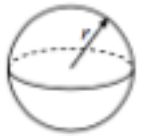
A solid is made by putting a hemisphere on top of a cone.



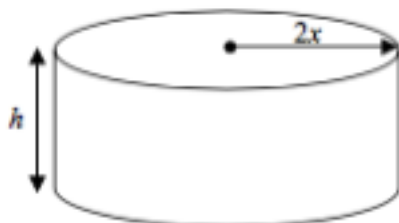
Volume of cone = $\frac{1}{3}\pi r^2 h$



Volume of sphere = $\frac{4}{3}\pi r^3$



The total height of the solid is $5x$
The radius of the base of the cone is x
The radius of the hemisphere is x



A cylinder has the same volume as the solid.
The cylinder has radius $2x$ and height h
All measurements are in centimetres.

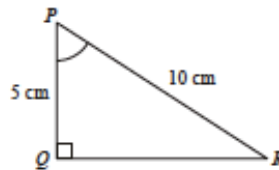
Find a formula for h in terms of x
Give your answer in its simplest form.

(Total 5 marks)

7.

- (a) PQR is a right-angled triangle.
 $PR = 10$ cm and $PQ = 5$ cm

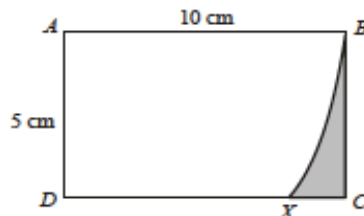
Not drawn accurately



- (i) Calculate the length QR . (3)

- (ii) Calculate the size of angle QPR . (3)

- (b) $ABCD$ is a rectangle.
 $AB = 10$ cm and $AD = 5$ cm.
An arc of a circle of radius 10 cm is drawn with centre A .
The arc starts at B and meets the side CD at X . Not drawn accurately



- Using your answers to part (a), or otherwise, calculate the shaded area. (5)
(Total 11 marks)

8.

Shereen has two bags of marbles.
Bag A contains 3 red marbles and 4 green marbles.
Bag B contains 2 red marbles and 3 green marbles.

Shereen throws a fair six-sided dice.
If the dice lands on a six, she takes a marble at random from bag A .
If the dice lands on any other number, she takes a marble at random from bag B .

- (a) Draw a fully labelled tree diagram showing the above information.
Mark the probabilities on the appropriate branches. (3)
- (b) Calculate the probability that a red marble is selected. (3)

(Total 6 marks)