

- 1.1** (a) Find the value of  $5^0$  (1)  
 (b) Find the value of  $27^{\frac{1}{3}}$  (1)  
 (c) Find the value of  $2^{-3}$  (1)

*March 2012 – Unit 2 (Modular)– Higher – Non-Calculator – Q11*

- 1.2** Write down the value of  
 (i)  $7^0$   
 (ii)  $5^{-1}$   
 (iii)  $9^{\frac{1}{2}}$

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

*March 2011 – Unit 2 (Modular) – Higher – Non-calculator – Q12*

- 1.3** (a) Write down the value of  $27^{\frac{1}{3}}$  (1)  
 (b) Find the value of  $25^{-\frac{1}{2}}$  (2)

*June 2011 – Unit 2 (Modular)– Higher –Non- Calculator- Q15*

- 1.4** Write down the value of

- (i)  $4^{-2}$   
 (ii)  $64^{\frac{1}{3}}$

**(Total for Question 13 is 2 marks)**

*November 2012 – Unit 2 (Modular) – Higher – Non-Calculator – Q13*

- 1.5** (a) Simplify  $x^0$  (1)  
 (b) Simplify  $\left(y^{\frac{3}{2}}\right)^4$  (2)

**(Total for Question 14 is 3 marks)**

*Practice Paper Set B – Unit 2 (Modular)– Higher – Non-Calculator – Q14*

- 2.1** Express 0.25 as a fraction in its simplest form. (3)

*March 2012 – Unit 2 (Modular)– Higher – Non-Calculator – Q14*

- 2.2** Write the recurring decimal  $0.0\dot{2}\dot{5}$  as a fraction.

**(Total for Question 13 is 3 marks)**

*Practice Paper Set B – Unit 2 (Modular)– Higher – Non-Calculator – Q13*

- 3.1** Rationalise the denominator  $\frac{3}{\sqrt{7}}$  (Total for Question 13 is 2 marks)

*November 2011 – Unit 2 (Modular) – Higher – Non-Calculator – Q13*

- 3.2** (a) Rationalise the denominator of  $\frac{15}{\sqrt{5}}$  (2)
- $(1 + \sqrt{3})^2$  can be written in the form  $a + b\sqrt{3}$ , where  $a$  and  $b$  are integers.
- (b) Work out the value of  $a$  and the value of  $b$ . (2)

*March 2012 – Unit 2 (Modular) – Higher – Non-Calculator – Q16*

- 3.3** (a) Express  $5\sqrt{27}$  in the form  $n\sqrt{3}$ , where  $n$  is a positive integer. (2)
- (b) Rationalise the denominator of  $\frac{21}{\sqrt{3}}$  (2)

*June 2011 – Unit 2 (Modular) – Higher – Non-Calculator – Q14*

- 3.4** (a) Write down the value of  $10^{-1}$ . (1)

- (b) Find the value of  $27^{\frac{2}{3}}$ . (2)

- (c) Write  $\sqrt{75}$  in the form  $k\sqrt{3}$ , where  $k$  is an integer. (2)

*June 2013 – Unit 2 (Modular) – Higher – Non-Calculator – Q17*

- 3.5** The perimeter of a square is  $\sqrt{120}$  cm.  
Work out the area of the square.  
Give your answer in its simplest form.

..... cm<sup>2</sup>

**(Total for Question 13 is 3 marks)**

*November 2013 – Unit 2 (Modular) – Higher – Non-Calculator – Q13*

- 5.1**  $y$  is directly proportional to  $x$ .  
When  $x = 600$ ,  $y = 10$
- (a) Find a formula for  $y$  in terms of  $x$ .

$y = \dots\dots\dots$  (3)

- (b) Calculate the value of  $y$  when  $x = 540$

$y = \dots\dots\dots$  (1)

*June 2012 – Unit 3 (Modular) – Higher – Calculator – Q13*

- 6.1** (a) Factorise  $e^2 - 100$  (1)

- (b) Factorise  $2x^2 - 7x - 15$  (2)

- (c) Simplify  $\frac{(g-7)^9}{(g-7)^3}$  (1)

*November 2011 – Unit 2 (Modular) – Higher – Non-Calculator – Q12*

- 6.2** Solve  $5x^2 - 3x - 7 = 0$   
Give your solutions correct to 3 significant figures.

**(Total for Question 19 is 3 marks)**

*Mock paper – Unit 3 (Modular) – Higher – Calculator – Q19*

6.3 Solve  $3x^2 + 2x - 1 = 0$

(Total for Question 19 is 3 marks)

Practice Paper Set C – Unit 3 (Modular) – Higher – Calculator – Q19

6.4 Solve  $2x^2 + 5x - 3 = 0$

(Total for Question 20 is 3 marks)

March 2013 – Unit 3 (Modular) – Higher – Calculator – Q20

6.5 Solve  $5x^2 + 6x - 2 = 0$

Give your solutions correct to 2 decimal places.

(Total for Question 18 is 3 marks)

June 2013 – Unit 3 (Modular) – Higher – Calculator – Q18

6.6 Solve, by factorising, the equation  $8x^2 - 30x - 27 = 0$ . [Grade A\* due to “8”]

(Total for Question 20 is 3 marks)

November 2013 – Unit 3 (Modular) – Higher – Calculator – Q20

8.1 Prove that  $(n - 1)^2 + n^2 + (n + 1)^2 = 3n^2 + 2$

(2)

June 2011 – Unit 2 (Modular) – Higher – Non- Calculator – Q12

\*8.2 The diagram shows a pentagon.

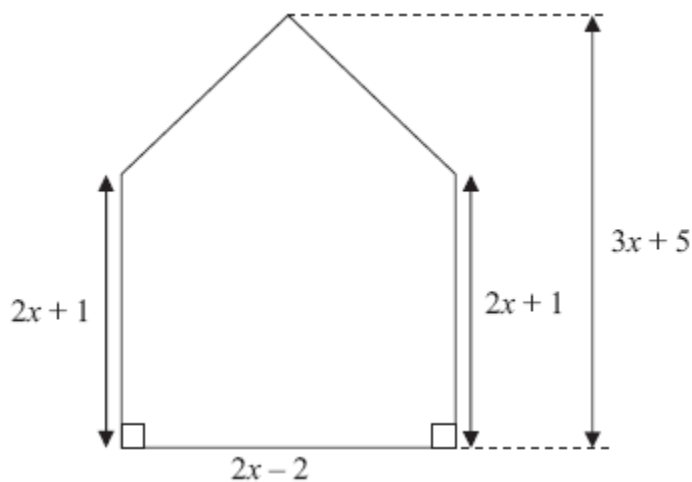


Diagram NOT accurately drawn

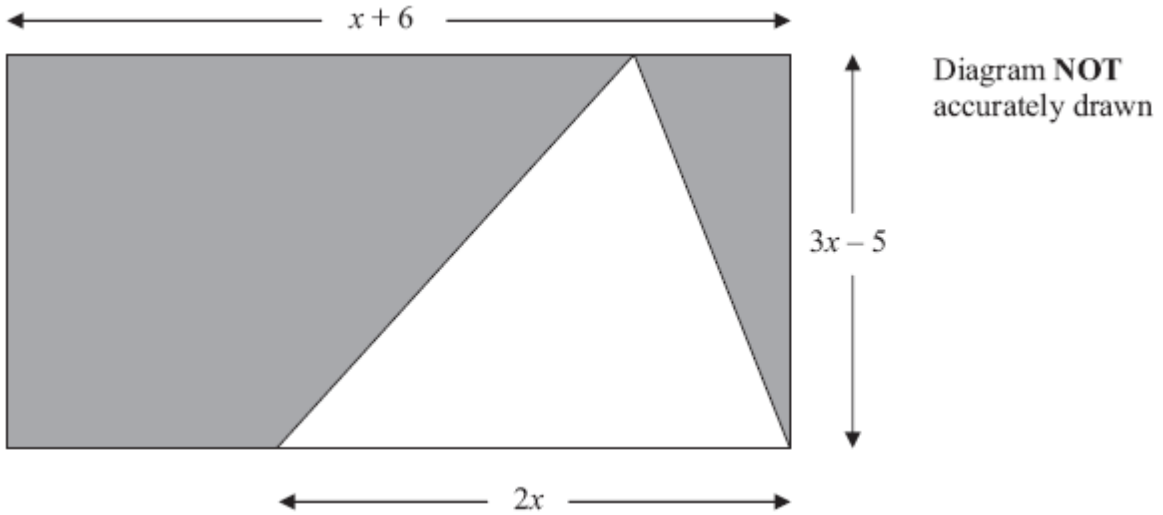
All measurements are in centimetres.

Show that the area of this pentagon can be written as  $5x^2 + x - 6$

(Total for Question 14 is 4 marks)

November 2010 – Unit 2 (Modular) – Higher – Non-calculator – Q14

**\*8.3** The diagram shows a triangle inside a rectangle.



All measurements are given in centimetres.

Show that the total area, in  $\text{cm}^2$ , of the shaded regions is  $18x - 30$  (4)

*March 2012 – Unit 2 (Modular)– Higher – Non-Calculator – Q13*

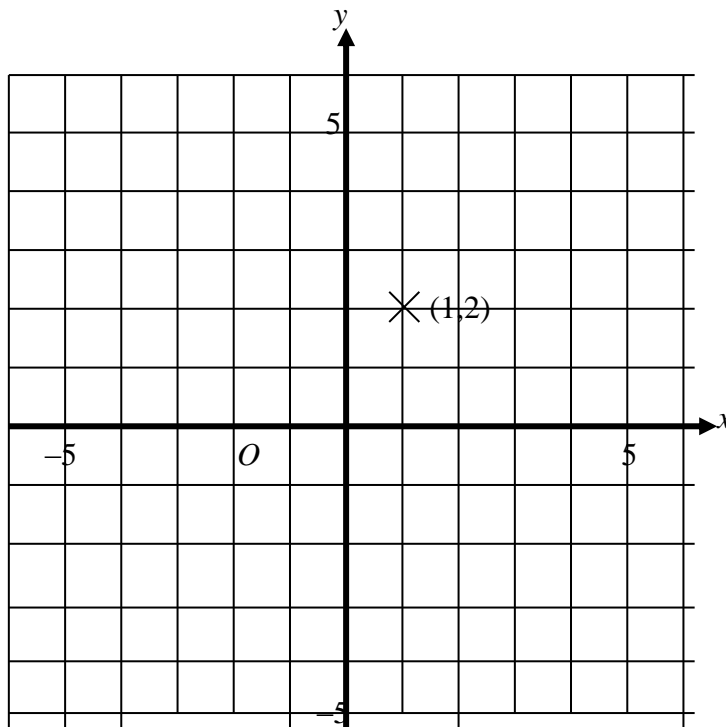
**8.4** Make  $x$  the subject of  $4x - 3 = 2(x + y)$

$x = \dots\dots\dots$

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

*March 2013 – Unit 3 (Modular) – Higher – Calculator – Q17*

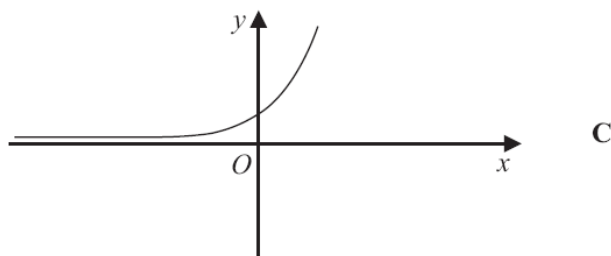
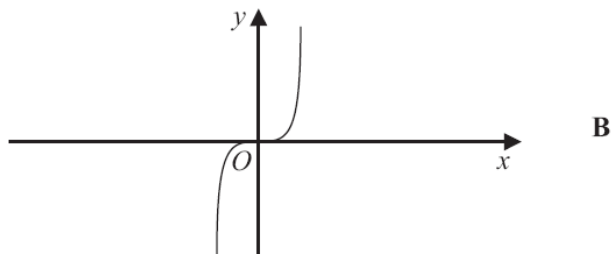
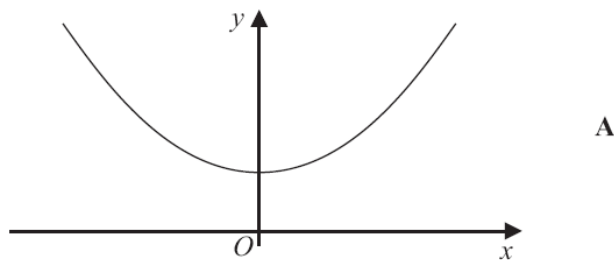
**\*9.1** Explain why any straight line that passes through the point  $(1, 2)$  must intersect the curve with equation  $x^2 + y^2 = 16$  at two points.



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

*Practice Paper Set A – Unit 3 (Modular)– Higher – Calculator – Q17*

9.2 Here are three graphs.



Here are four equations of graphs.

$$y = x^3 \quad y = x^2 + 4 \quad y = \frac{1}{x} \quad y = 2^x$$

Match each to the correct equation.

**A** and  $y = \dots\dots\dots$

**B** and  $y = \dots\dots\dots$

**C** and  $y = \dots\dots\dots$

**(Total for Question 14 is 3 marks)**

*March 2013 – Unit 1 (Modular) – Higher – Calculator – Q14*

**10.1** (a) Write down the equation of a straight line that is parallel to  $y = 5x + 6$  (1)

(b) Find an equation of the line that is perpendicular to the line  $y = 5x + 6$  and passes through the point  $(-2, 5)$ .

(3)

*March 2011 – Unit 2 (Modular) – Higher – Non-calculator – Q13*

10.2

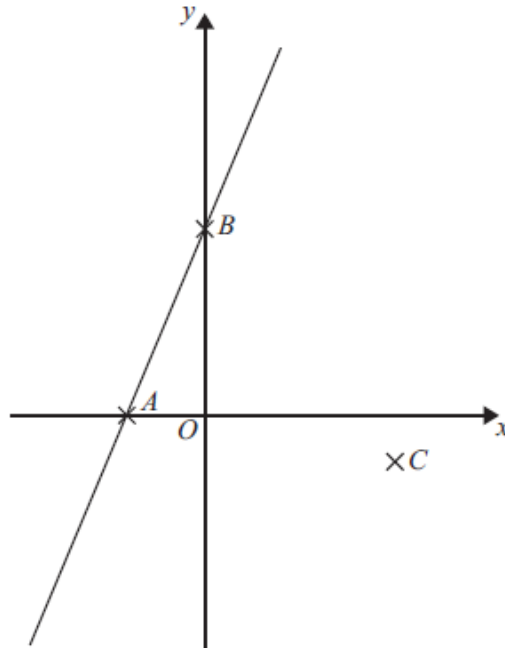


Diagram NOT accurately drawn

In the diagram  
 A is the point  $(-2, 0)$   
 B is the point  $(0, 4)$   
 C is the point  $(5, -1)$

Find an equation of the line that passes through C and is perpendicular to AB.

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

*November 2012 – Unit 2 (Modular) – Higher – Non-Calculator – Q16*

**10.3** Find an equation of the straight line that is perpendicular to the straight line  $x + 2y = 5$  and that passes through the point  $(3, 7)$ .

**(Total for Question 17 is 4 marks)**

*June 2012 – Unit 2 (Modular) – Higher – Non-Calculator – Q17*

**10.4** A straight line,  $L$ , is perpendicular to the line with equation  $y = 1 - 3x$ .  
 The point with coordinates  $(6, 3)$  is on the line  $L$ .  
 Find an equation of the line  $L$ .

**(3)**

*March 2012 – Unit 2 (Modular) – Higher – Non-Calculator – Q15*

10.5

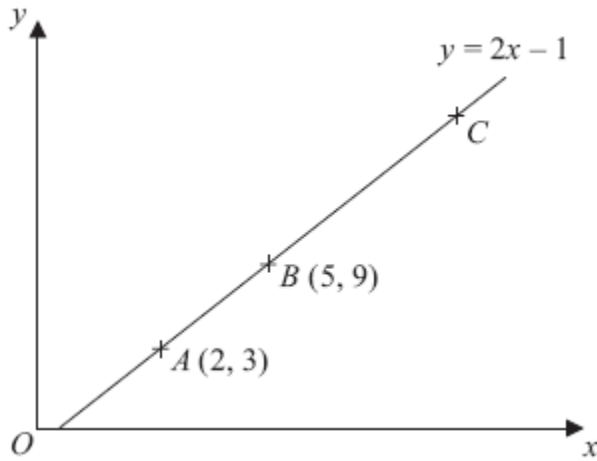


Diagram NOT accurately drawn

In the diagram,  
 the points  $A$ ,  $B$  and  $C$  lie on the straight line  $y = 2x - 1$   
 The coordinates of  $A$  are  $(2, 3)$ .  
 The coordinates of  $B$  are  $(5, 9)$ .

Given that  $AC = 3AB$ , find the coordinates of  $C$ .

**(Total for Question 18 is 3 marks)**

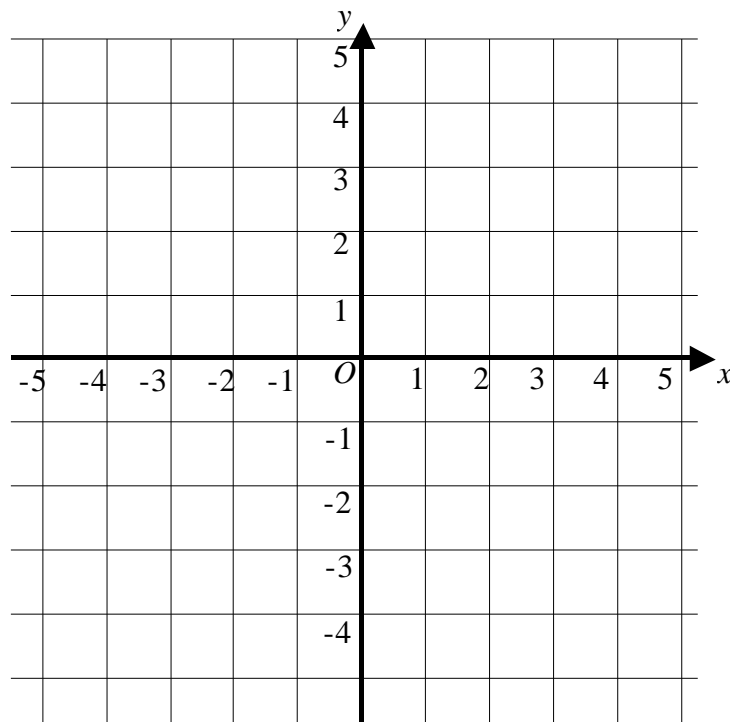
*March 2013 – Unit 3 (Modular) – Higher – Calculator – Q2*

11.1 (a)  $-2 < x \leq 1$   
 $x$  is an integer.  
 Write down all the possible values of  $x$ .

(2)

(b)  $-2 < x \leq 1$      $y > -2$      $y < x + 1$   
 $x$  and  $y$  are integers.

On the grid below mark with a cross ( $\times$ ), each of the six points which satisfies **all** these 3 inequalities.



(3)

- 11.2** (a) Given that  $x$  is an integer such that  $-2 < x \leq 3$   
 $y$  is an integer such that  $-1 \leq y < 5$   
and  $y = x$

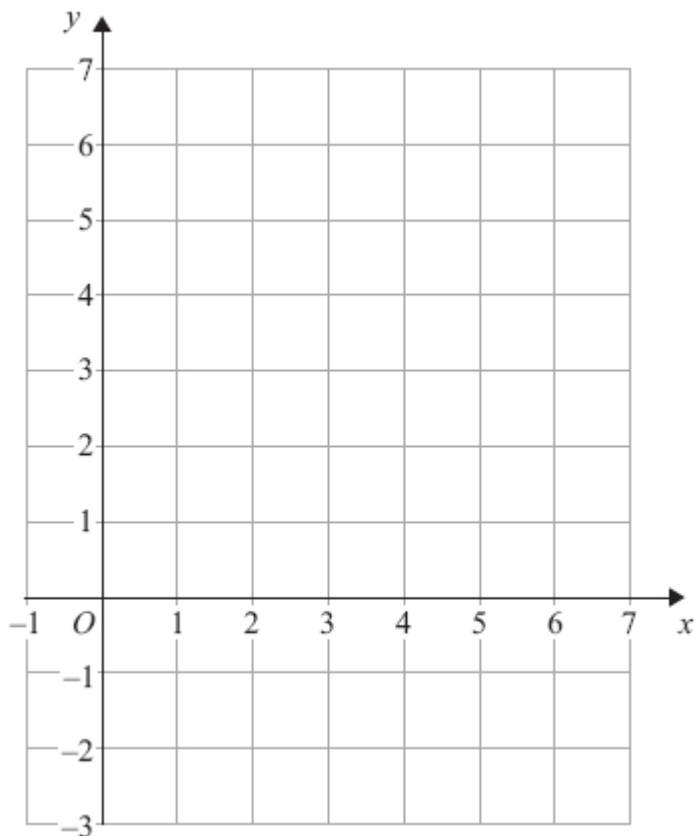
write down the possible values of  $x$ .

(2)

- (b) On the grid below, show by shading the region defined by the inequalities

$$y > 1 \quad y < 2x - 2 \quad y < 6 - x \quad x > 0$$

Mark this region with the letter R.



(4)



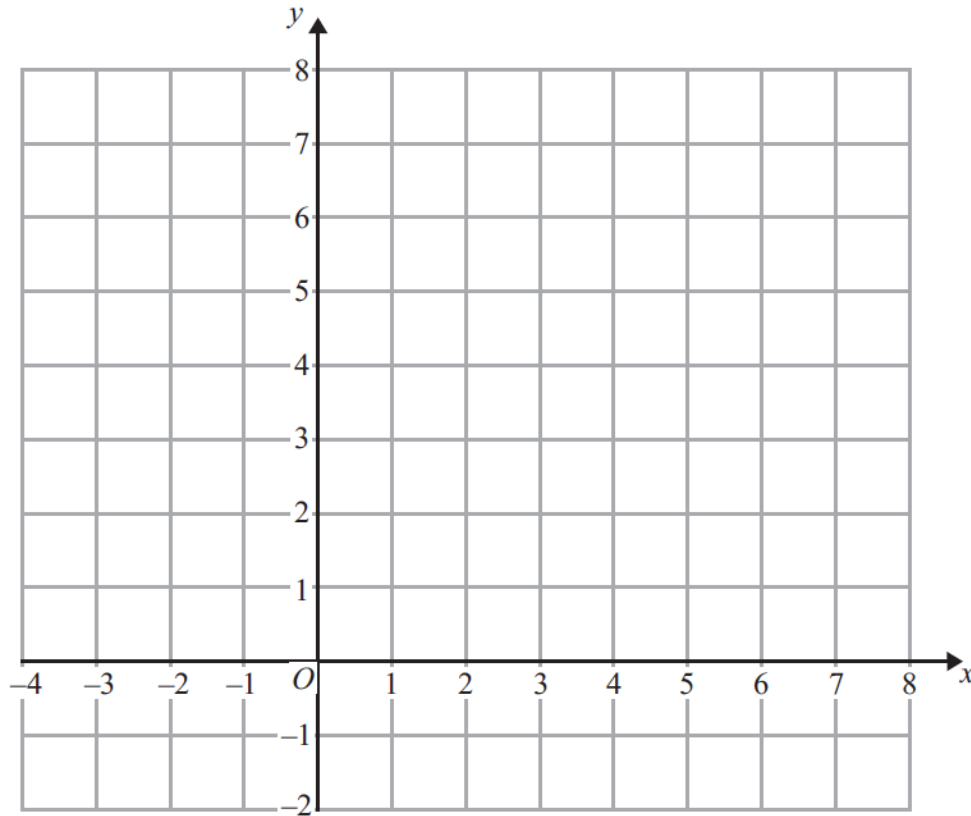
11.3 On the grid below, show by shading, the region defined by the inequalities

$$x + y < 6$$

$$x > -1$$

$$y > 2$$

Mark this region with the letter R.



(Total for Question 12 is 4 marks)

November 2013 – Unit 3 (Modular) – Higher – Calculator – Q12

13.1

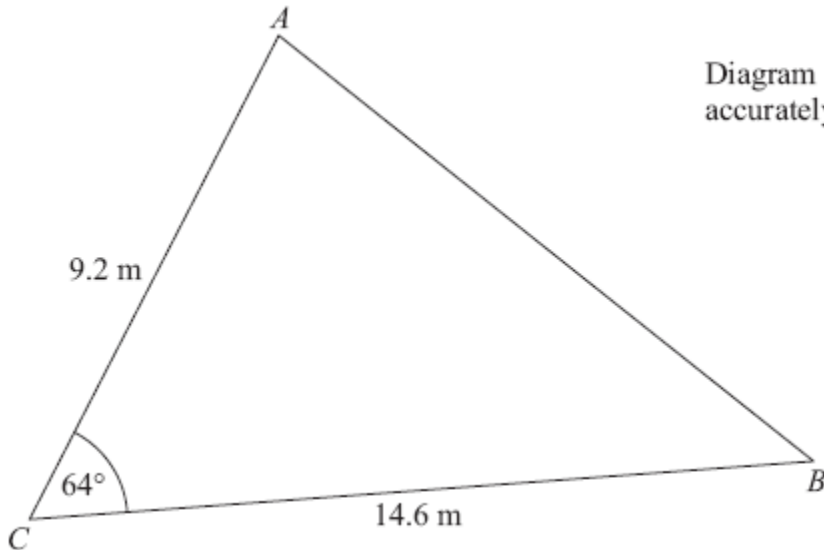


Diagram NOT accurately drawn

$$AC = 9.2 \text{ m}$$

$$BC = 14.6 \text{ m}$$

$$\text{Angle } ACB = 64^\circ$$

(a) Calculate the area of the triangle  $ABC$ .

Give your answer correct to 3 significant figures.

.....  $\text{m}^2$ (2)

(b) Calculate the length of  $AB$ .

Give your answer correct to 3 significant figures.

.....  $\text{m}$ (3)

14.1 Ella is designing a glass in the shape of a cylinder.

The glass must hold a minimum of  $\frac{1}{2}$  litre of liquid.

The glass must have a diameter of 8 cm.

Calculate the minimum height of the glass.

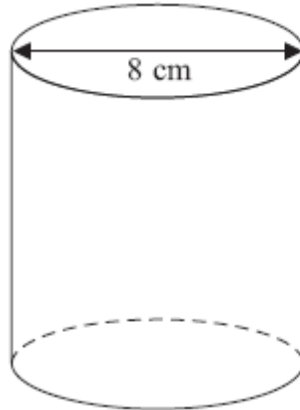


Diagram NOT  
accurately drawn

..... cm

**(Total for Question 12 is 5 marks)**

14.2 Here is a vase in the shape of a cylinder.

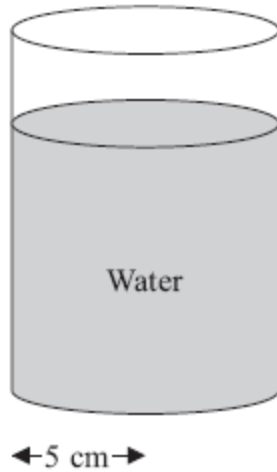


Diagram NOT  
accurately drawn

The vase has a radius of 5 cm.

There are  $1000 \text{ cm}^3$  of water in the vase.

Work out the depth of the water in the vase.

Give your answer correct to 1 decimal place.

..... cm

**(Total for Question 16 is 3 marks)**

**14.3** Jane has a flower bed in the shape of an equilateral triangle.

The perimeter of the flower bed is 15 metres.

(a) Work out the area of the flower bed.

Give your answer correct to 1 decimal place.

..... m<sup>2</sup>  
(3)

Jane has some containers in the shape of hemispheres with diameter 35 cm.

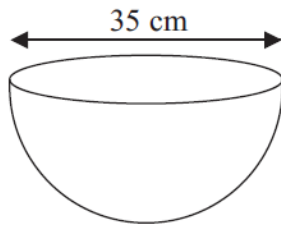


Diagram NOT accurately drawn

Jane is going to fill the containers completely with compost.

She has 80 litres of compost.

1 litre = 1000 cm<sup>3</sup>.

(b) Work out how many containers Jane can fill completely with compost.

(4)

*November 2013 – Unit 3 (Modular) – Higher – Calculator – Q16*

**15.1** Ali has two solid cones made from the same type of metal.

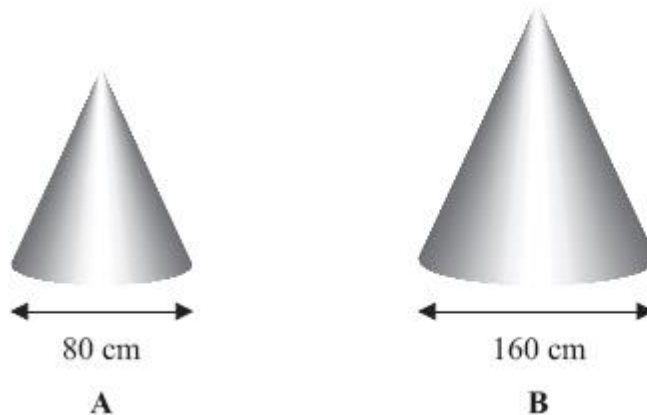


Diagram NOT accurately drawn

The two solid cones are mathematically similar.

The base of cone **A** is a circle with diameter 80 cm.

The base of cone **B** is a circle with diameter 160 cm.

Ali uses 80 ml of paint to paint cone **A**.

Ali is going to paint cone **B**.

(a) Work out how much paint, in ml, he will need.

..... ml  
(2)

The volume of cone **A** is 171 700 cm<sup>3</sup>.

(b) Work out the volume of cone **B**.

..... cm<sup>3</sup>  
(3)

*June 2012 – Unit 3 (Modular) – Higher – Calculator – Q17*

15.2 Kalinda has two solid cylinders made of the same material.

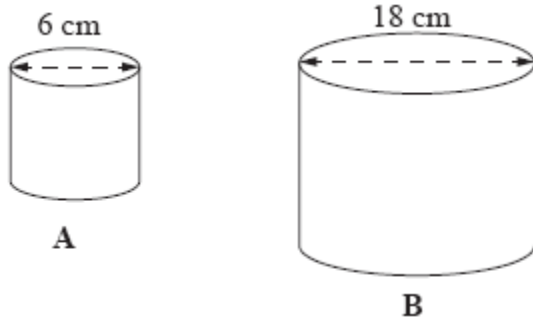


Diagram NOT  
accurately drawn

The cylinders are mathematically similar.

Cylinder **A** has a diameter of 6 cm.

Cylinder **B** has a diameter of 18 cm.

Cylinder **A** has a mass of 80 g.

Work out the mass of cylinder **B**.

..... g

**(Total for Question 18 is 2 marks)**

*Mock paper – Unit 3 (Modular) – Higher – Calculator – Q18*

15.3 The volumes of two mathematically similar solids are in the ratio 27 : 125

The surface area of the smaller solid is  $36\text{cm}^2$ .

Work out the surface area of the larger solid.

.....  $\text{cm}^2$

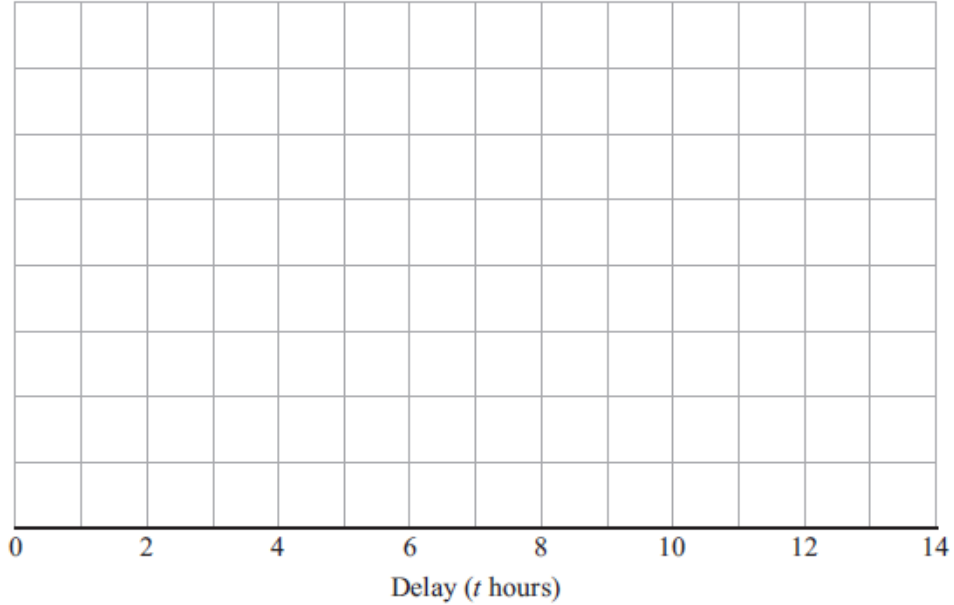
**(Total for Question 15 is 3 marks)**

*Practice Paper Set A – Unit 3 (Modular) – Higher – Calculator – Q15*

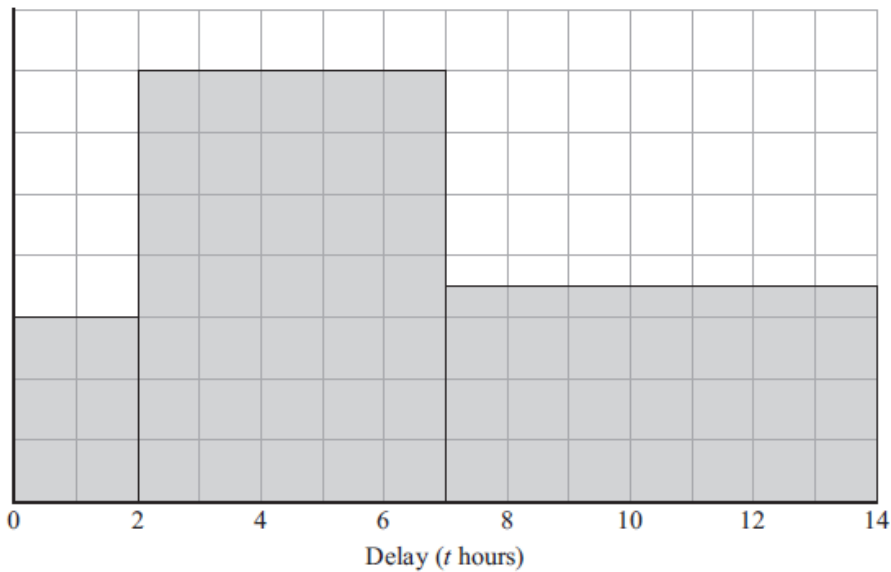
16.1 During one week in January, the flights from an airport were delayed. The table shows information about the flight delays on Monday.

Delay ( $t$ hours)	Frequency
$0 < t \leq 2$	4
$2 < t \leq 7$	60
$7 < t \leq 11$	40
$11 < t \leq 13$	6

(a) Draw a histogram for the information given in the table. (3)



The histogram below shows information about the flight delays on Tuesday.



12 flights were delayed for up to 2 hours.

Avi says

“A greater number of flights were delayed for more than 7 hours on Monday than for more than 7 hours on Tuesday.”

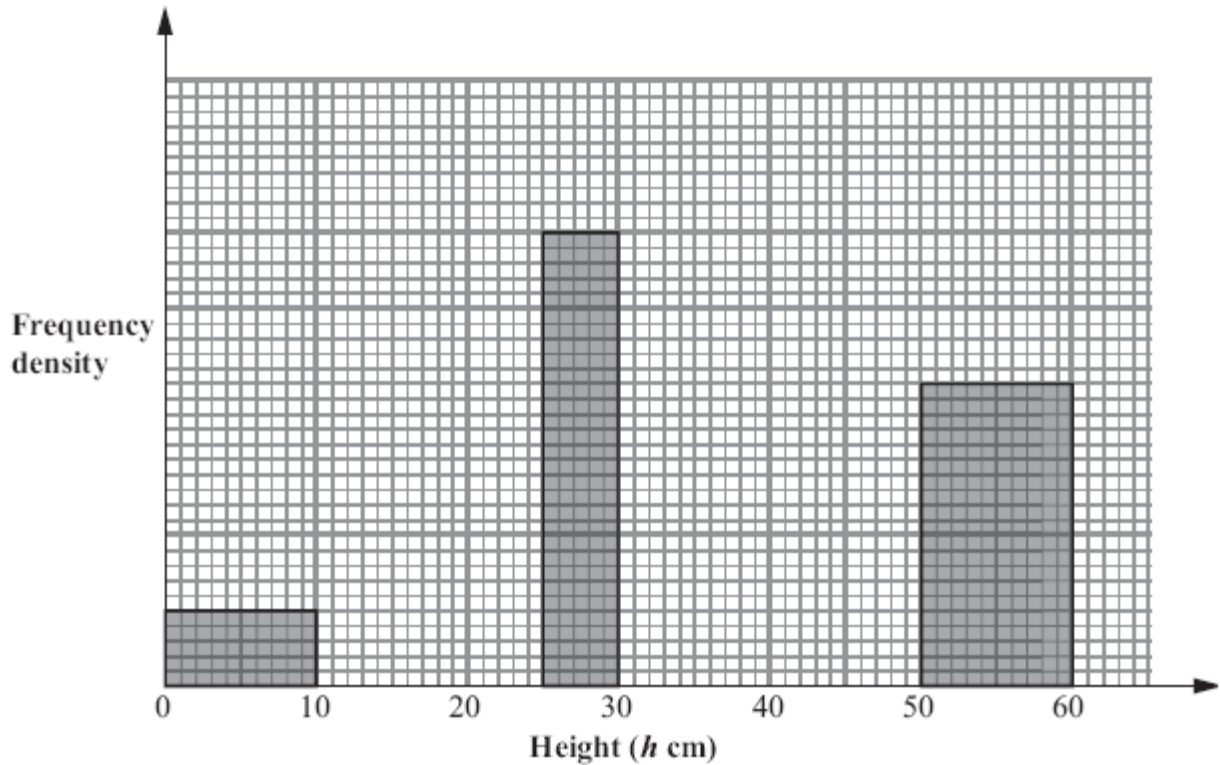
(b) Is Avi correct?

You must explain your answer.

(2)

**16.2** The incomplete frequency table and histogram give some information about the heights, in centimetres, of some tomato plants.

Height( $h$ cm)	Frequency
$0 < h \leq 10$	
$10 < h \leq 25$	30
$25 < h \leq 30$	
$30 < h \leq 50$	50
$50 < h \leq 60$	20



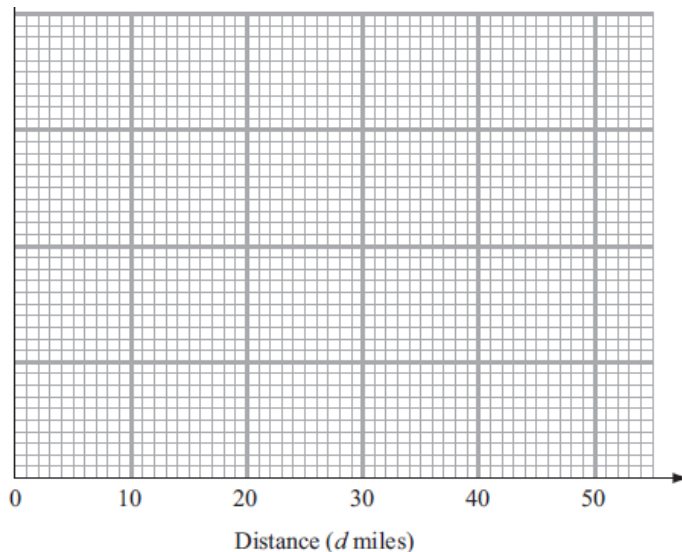
- (a) Use the information in the histogram to complete the table. (2)
- (b) Use the information in the table to complete the histogram. (2)

*March 2011 – Unit 1 (Modular) – Higher – Calculator – Q14*

16.3 The table gives some information about the distances, in miles, that some men travelled to work.

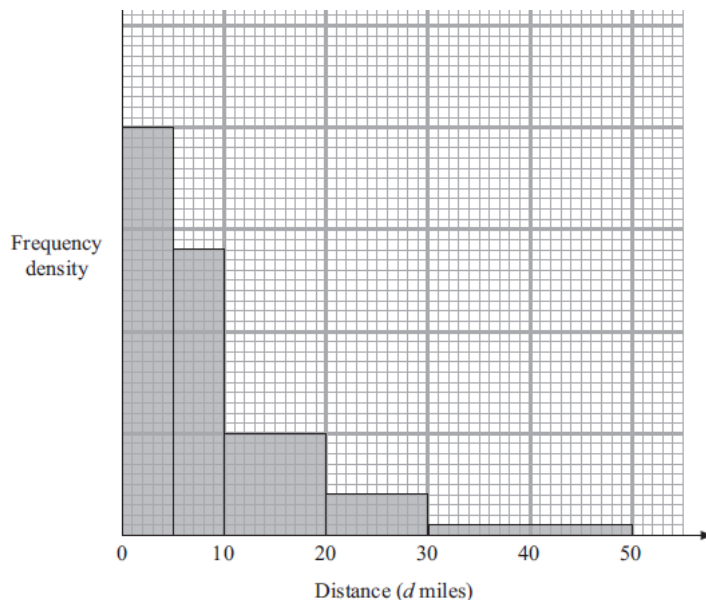
Distance ( $d$ miles)	Frequency
$0 < d \leq 5$	15
$5 < d \leq 10$	17
$10 < d \leq 20$	10
$20 < d \leq 30$	6
$30 < d \leq 50$	2

(a) Draw a histogram for the information in the table.



(3)

The histogram below shows information about the distances, in miles, that some women travelled to work.



$x$  women travelled between 10 and 20 miles to work.

(b) Find an expression, in terms of  $x$ , for the total number of women represented by the histogram.

.....

(2)

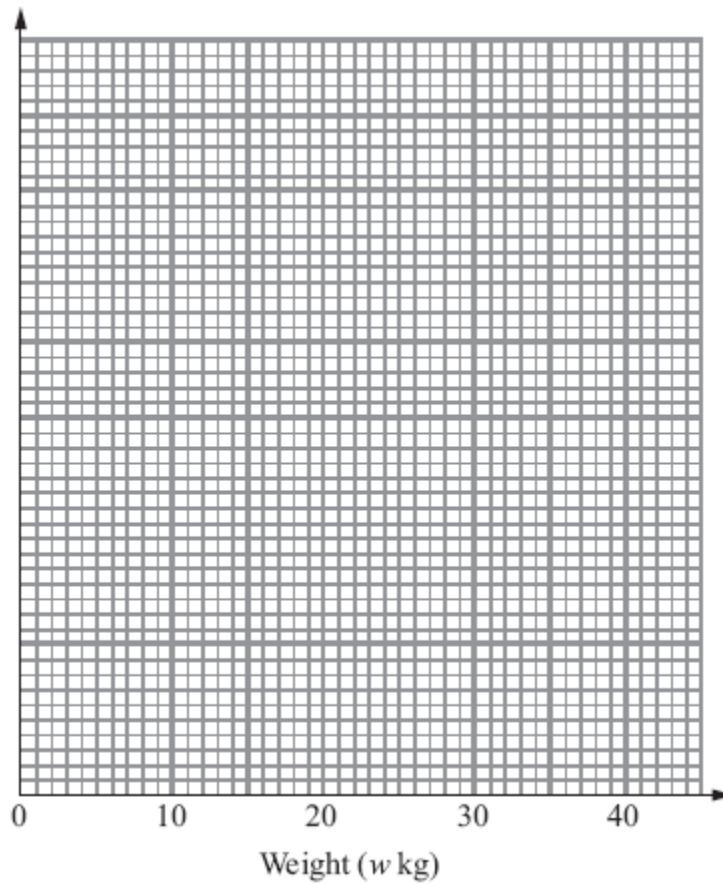
**16.4** The table gives some information about the weights, in kg, of 50 suitcases at an airport check-in desk.

Weight ( $w$ kg)	Frequency
$0 < w \leq 10$	16
$10 < w \leq 15$	18
$15 < w \leq 20$	10
$20 < w \leq 35$	6

(a) Work out an estimate for the mean weight. (4)

Passengers have to pay extra money for any suitcase that weighs more than 20 kg. Two of the 50 suitcases are chosen at random.

(b) Work out the probability that both suitcases weigh more than 20 kg. (2)  
 (c) On the grid, draw a histogram for the information in the table.

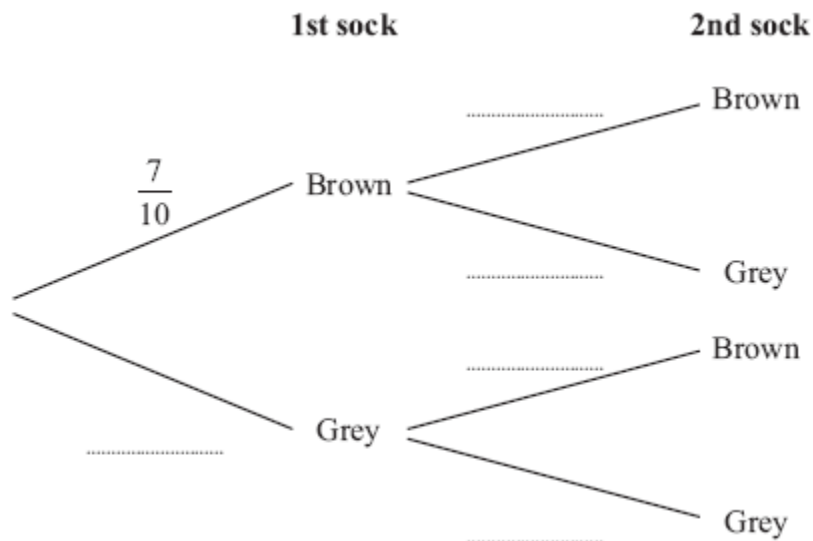


(3)

*November 2010 – Unit 1 (Modular) – Higher – Calculator – Q10*



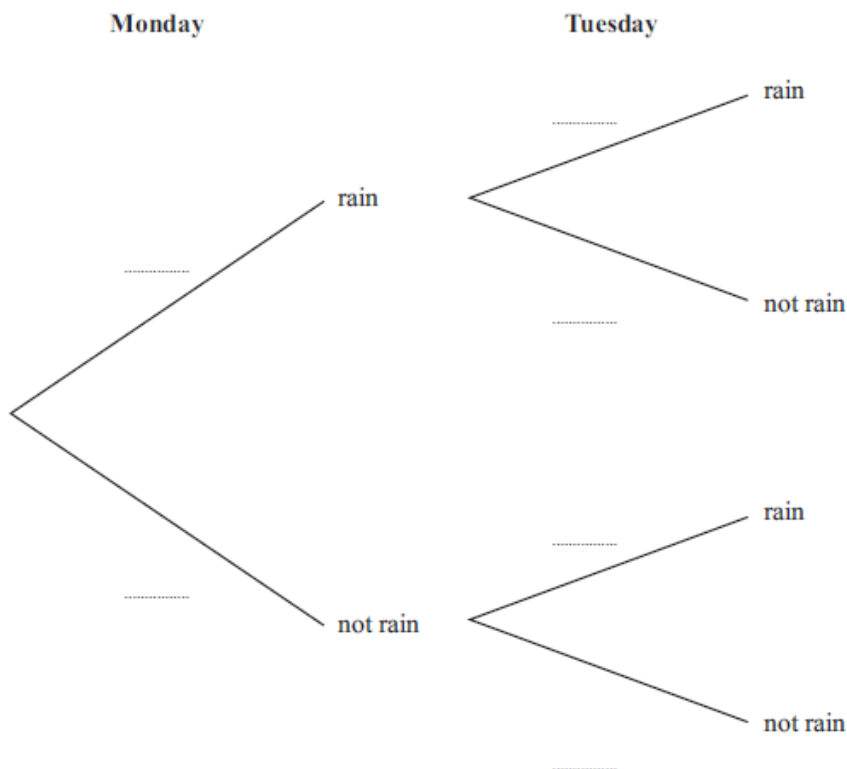
- 17.1** There are 10 socks in a drawer.  
 7 of the socks are brown.  
 3 of the socks are grey.  
 Bevan takes at random two socks from the drawer at the same time.  
 (a) Complete the probability tree diagram.



- (b) Work out the probability that Bevan takes two socks of the same colour. (2)

(3)  
 November 2010 – Unit 1 (Modular) – Higher – Calculator – Q12

- 17.2** The probability that it will rain on Monday is 0.6.  
 When it rains on Monday, the probability that it will rain on Tuesday is 0.8.  
 When it does **not** rain on Monday, the probability that it will rain on Tuesday is 0.5.

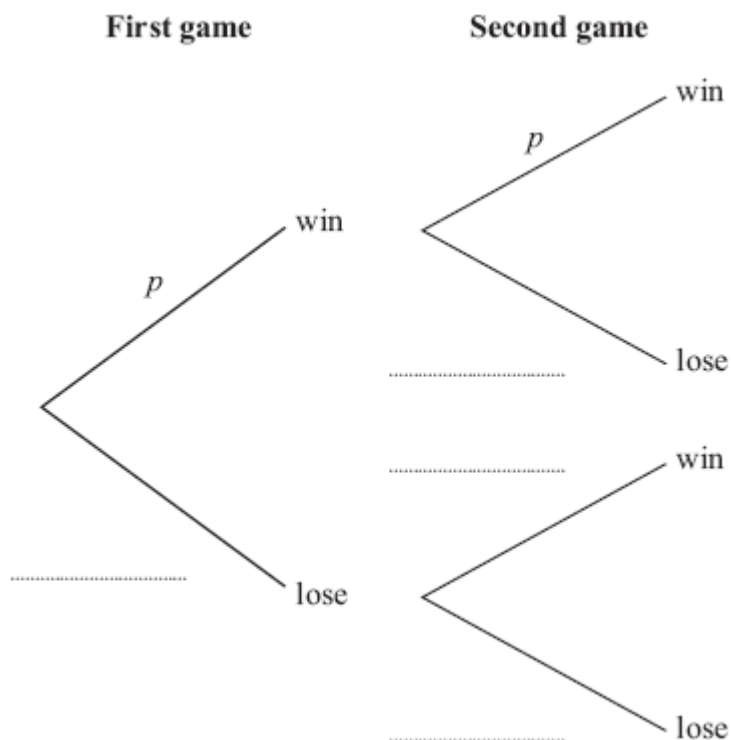


- (a) Complete the probability tree diagram. (2)  
 (b) Work out the probability that it will rain on both Monday and Tuesday. (2)  
 (c) Work out the probability that it will rain on at least one of the two days. (3)

June 2011 – Unit 1 (Modular) – Higher – Calculator – Q10

**17.3** The probability that Rebecca will win any game of snooker is  $p$ . She plays two games of snooker.

(a) Complete, in terms of  $p$ , the probability tree diagram.



(2)

(b) Write down an expression, in terms of  $p$ , for the probability that Rebecca will win both games.

(1)

(c) Write down an expression, in terms of  $p$ , for the probability that Rebecca will win exactly one of the games.

(2)