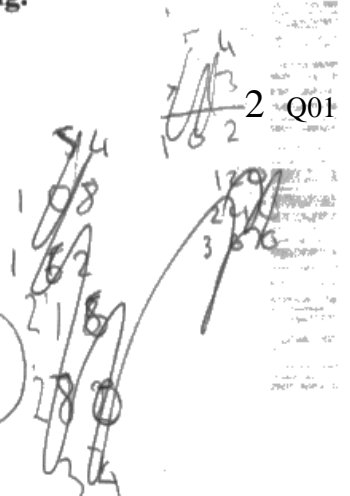
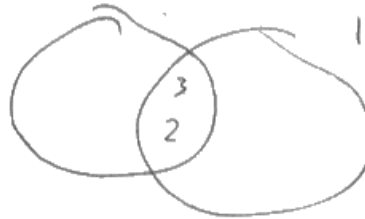
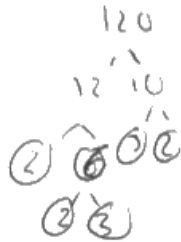
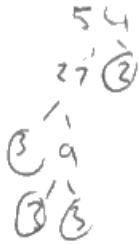


Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Find the highest common factor (HCF) of 54 and 120

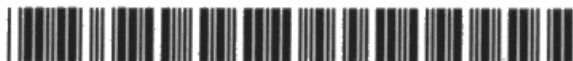


$$2 \times 2 \times 2 \times 3 \times 3 = 120$$
$$3 \times 3 \times 3 \times 2 = 54$$

$$3 \times 2 = 6$$

(Total for Question 1 is 2 marks)

2



- 2 There are only red counters, white counters, blue counters and green counters in a bag.

Chris is going to take at random a counter from the bag.

The table shows the probability that he will take a red counter and the probability that he will take a white counter.

Colour	red	white	blue	green
Probability	0.3	0.1	0.4	0.2

There are twice as many blue counters as there are green counters in the bag.

- (a) Work out the probability that Chris will take a blue counter.

$$P = 0.3 + 0.1 = 0.4$$

$$1 - 0.4 = 0.6$$

$$P = \frac{0.6}{3} = 0.2$$

0.4

(33) Q02a

There are 45 red counters in the bag.

- (b) Work out the total number of counters in the bag.

$$0.3 = 45 \quad \Rightarrow \frac{45}{0.3} = 150$$

$$1 = 150 \quad \Rightarrow 0.1 = 15$$

$$15 \times 2 = 30$$

$$R = 45$$

$$G = 30$$

$$W = 15$$

$$B = 60$$

$$150$$

$$15 \times 4 = 60$$

150

(22) Q02b

(Total for Question 2 is 5 marks)

5



P 7 6 4 0 3 A 0 3 2 0

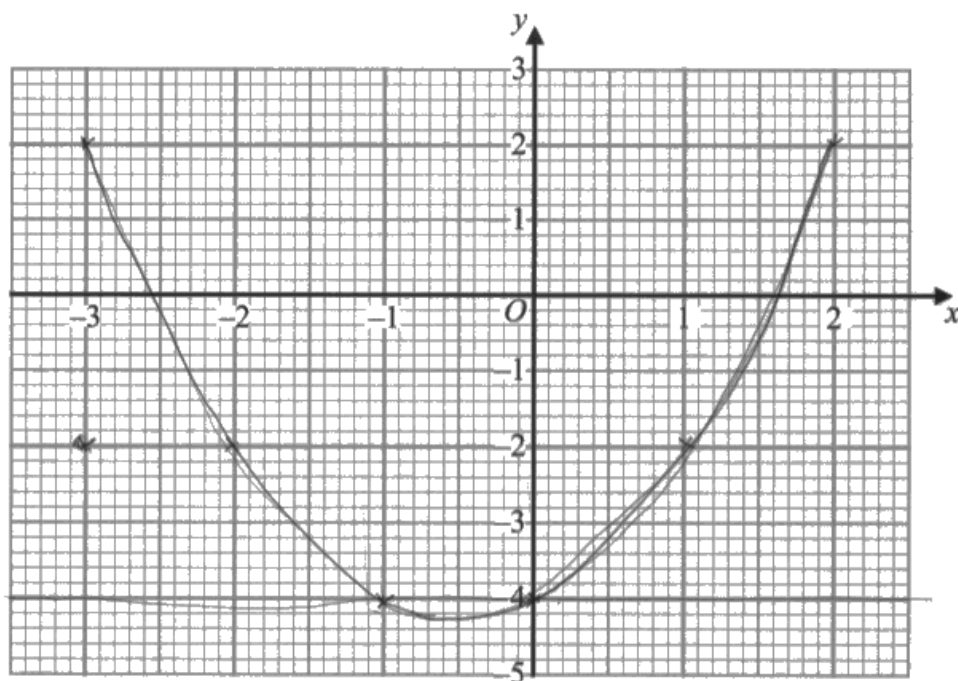
3 (a) Complete the table of values for  $y = x^2 + x - 4$

x	-3	-2	-1	0	1	2
y	2	-2	-4	-4	-2	2

$y = -2^2 + -2 - 4 = -4 - 2 - 4 = -10$   
 $-2^2 = 4 + -2 = 2$   
 $2 + 4 = 6$

(2) 2 Q03a

(b) On the grid, draw the graph of  $y = x^2 + x - 4$  for values of  $x$  from -3 to 2



(2) 2 Q03b

(c) Write down the coordinates of the turning point of the graph of  $y = x^2 + x - 4$

(-0.5, -4.25)

(1) 0 Q03c

(Total for Question 3 is 5 marks)

4



- 4 There are 280 chocolates in a box.  
There are only dark chocolates, milk chocolates and white chocolates.

$\frac{1}{7}$  of the 280 chocolates are dark chocolates.

The number of milk chocolates : the number of white chocolates = 1 : 3

The number of white chocolates : the number of dark chocolates =  $n$  : 1

- (a) Work out the value of  $n$ .  
You must show all your working.

$$\frac{1}{7} \text{ of } 280 = 40 = \text{dark chocolate}$$

$$280 - 40 = 240$$

$$\frac{240}{4} = 60 = 1r = \text{milk chocolate}$$

$$60 \times 3 = 180 = \text{white chocolate}$$

$$180 : 40 = 4.5 : 1$$

$$40 \overline{) 180} \begin{array}{r} 4 \\ 160 \\ \hline 20 \end{array}$$

$$40 \overline{) 180} \begin{array}{r} 4 \\ 160 \\ \hline 20 \end{array}$$

$$n = 4.5$$

(5) Q04a

10 milk chocolates from the box are eaten.

- (b) Does this affect your answer to part (a)?  
Give a reason for your answer.

It will affect the answer to part a  
as number of white chocolates will be less

(1) Q04b

(Total for Question 4 is 6 marks)

5



P 7 6 4 0 3 A 0 5 2 0

- 5 Work out  $5.7 \times 10^2 + 9.8 \times 10^3$   
Give your answer in standard form.

3 Q05

$$5.7 \times 10^2 = 570$$

$$\begin{array}{r} 9.8 \times 10^3 = 9800 \\ + 570 \\ \hline 10370 \end{array}$$

$$\cancel{10370} \quad 10370 = 1.037 \times 10^4$$

$$1.037 \times 10^4$$

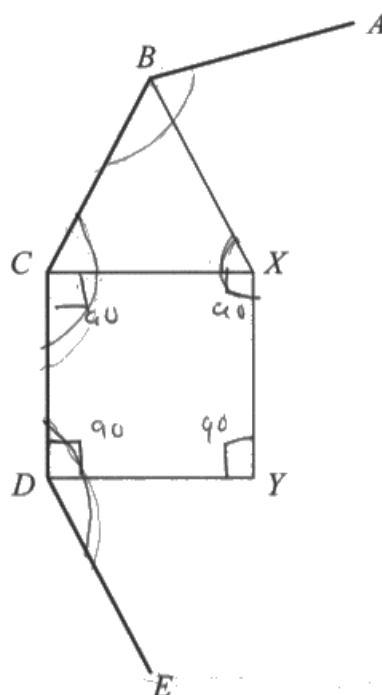
(Total for Question 5 is 3 marks)

3



6  $AB$ ,  $BC$ ,  $CD$  and  $DE$  are four sides of a regular polygon with  $n$  sides.

0 Q06



$BCX$  is an equilateral triangle.

$CDYX$  is a square.

Work out the value of  $n$ .

You must show all your working.

$$BCX = 180$$

$n =$  .....

(Total for Question 6 is 4 marks)

0

7 (a) Simplify  $\frac{3(2-m)^2}{2-m}$

$$\frac{3(2-m)(2-m)}{2-m}$$

$$3(2-m) = 6-3m$$

$$6-3m$$

(1) 1 Q07a

(b) Solve  $7+x \leq \frac{5x}{2} - 8$

$$7+x = \frac{5x}{2} - 8$$

$$15+x = \frac{5x}{2}$$

$$2(15+x) = 5x$$

$$30+2x = 5x$$

$$30 = 3x$$

$$\frac{30}{3} = x = 10$$

$$\frac{30}{3} = x = 10$$

$$x=10$$

(3) 2 Q07b

(c) Solve  $9 < 2y+4 < 12$

$$9 = 2y+4 < 12$$

$$2y-5 = 12$$

$$2y = 7$$

$$y = \frac{7}{2} = 4.5$$

$$y=4.5$$

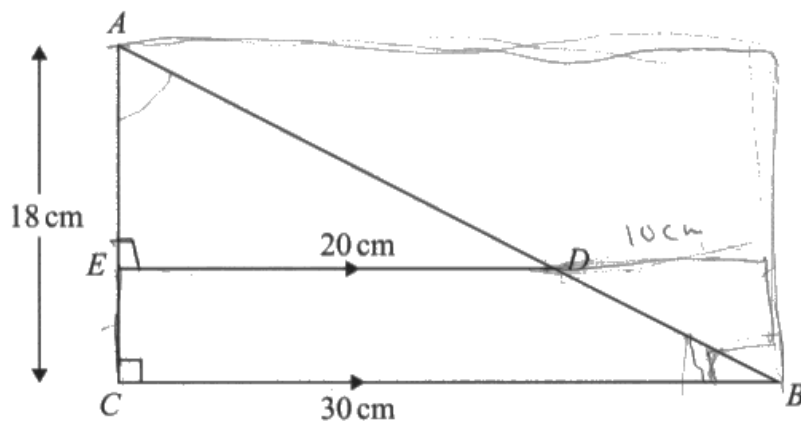
(2) 0 Q07c

3

(Total for Question 7 is 6 marks)



8  $ABC$  is a right-angled triangle.



$AEC$  and  $ADB$  are straight lines.  
 $ED$  is parallel to  $CB$ .

(a) Prove that triangle  $ABC$  is similar to triangle  $ADE$ .

$$\begin{aligned} \angle AED &= 90^\circ \\ \angle ACB &= 90^\circ \end{aligned}$$

$$\begin{aligned} \angle B &= 45^\circ \\ \angle D &= 45^\circ \end{aligned}$$

$$\begin{array}{r} 90 \\ + 45 \\ \hline 135 \end{array}$$

$$\begin{aligned} \angle A + \angle D + 90 &= 180 \\ \angle A + \angle B + 90 &= 180 \end{aligned}$$

$$\begin{aligned} \angle A + 135 &= 180 \\ \angle A &= 45 \end{aligned}$$

(20) Q08a

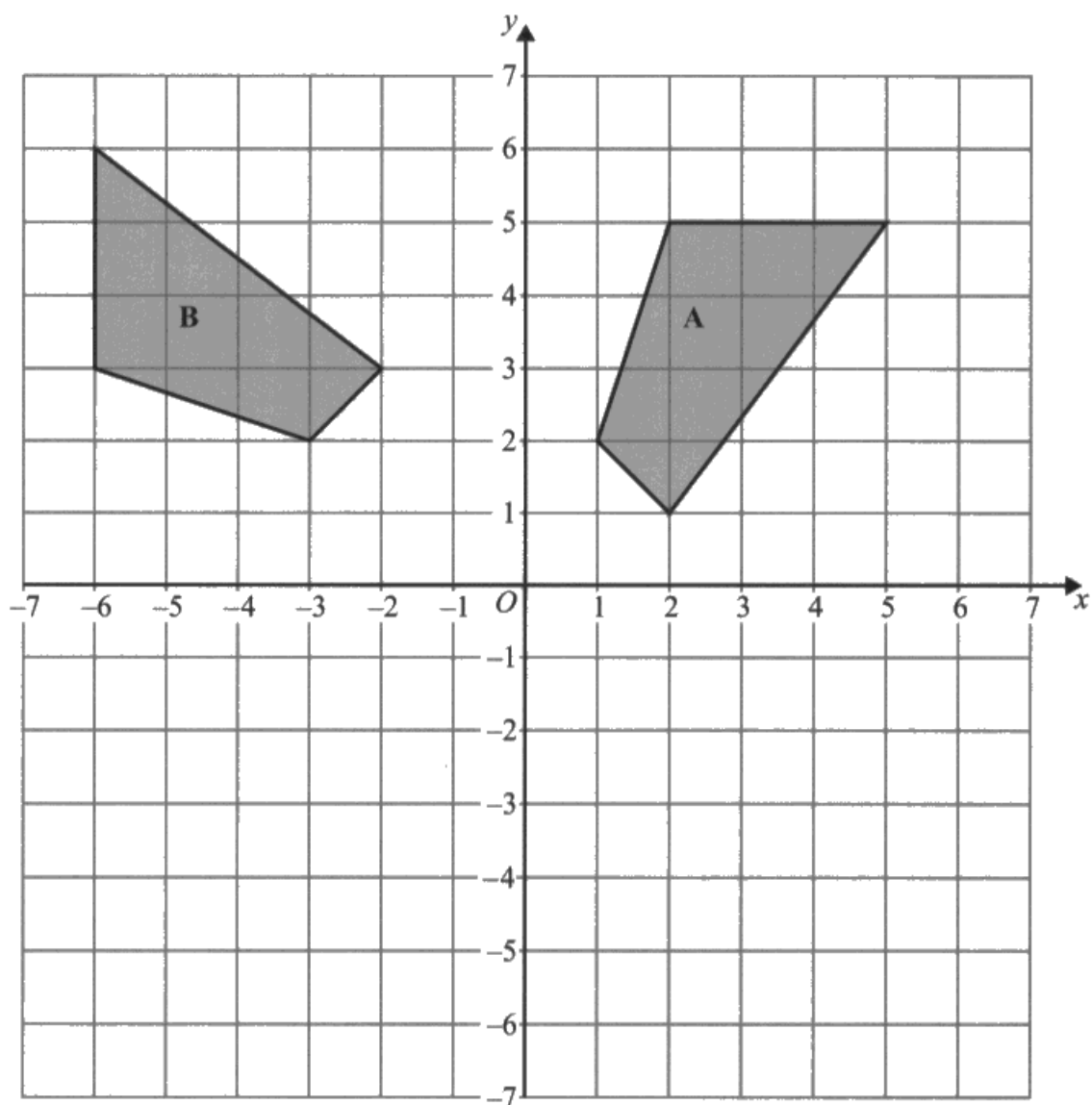
$$ED = 20 \text{ cm} \quad CB = 30 \text{ cm} \quad AC = 18 \text{ cm}$$

(b) Work out the length of  $EC$ .

(Total for Question 8 is 5 marks)

cm  
 (30) Q08b  
 0



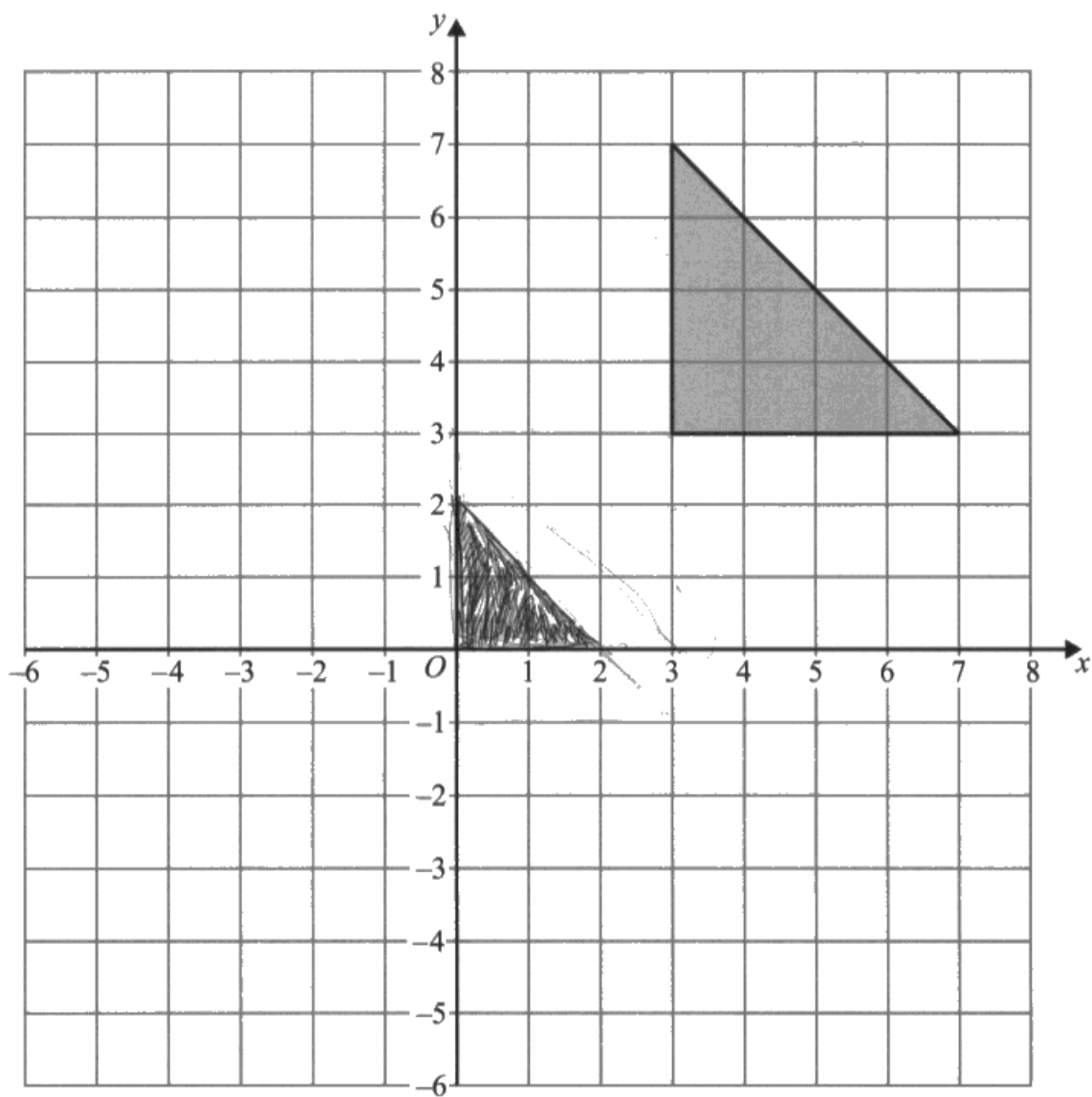


(a) Describe fully the single transformation that maps shape A onto shape B.

Rotation of  $360^\circ$  with midpoint of  $(-1, 0)$

(2) 0 Q09a





(b) Enlarge the triangle by scale factor  $\frac{1}{2}$  centre  $(-1, -3)$

(2) Q09b

(Total for Question 9 is 4 marks)

1

10 Prove that the difference in the squares of two consecutive even numbers is always a multiple of 4

0 Q10

~~2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100~~

4 8 ~

$$2n+2 =$$

(Total for Question 10 is 3 marks)

0



11  $T$  is inversely proportional to  $w$ .

$w$  is directly proportional to the cube root of  $d$ .

When  $w = 6$ ,  $T = 20$

When  $w = 1$ ,  $d = 8$

Find the value of  $d$  when  $T = 48$

2 Q11

$$y = \frac{k}{x}$$

$$T = \frac{k}{w}$$

$$20 = \frac{k}{6}$$

$$\frac{20}{6} =$$

$$\begin{array}{r} 03.3 \\ 6 \overline{) 20.0} \end{array}$$

$$y = kx$$

~~$$y = kx$$~~

$$1 = T \times 8$$

30 *you*

$$\frac{1}{8} = T$$

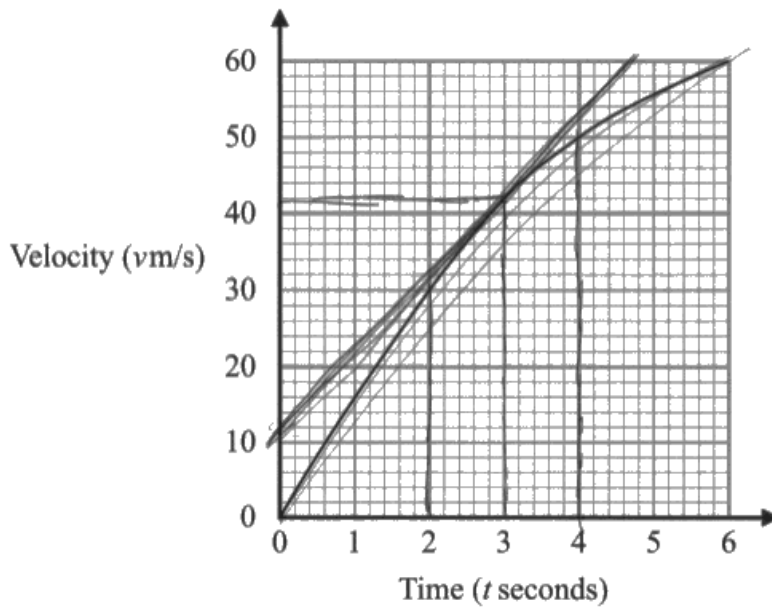
$d =$  .....

(Total for Question 11 is 5 marks)

2



12 The graph shows the velocity,  $v$  m/s, of a particle  $t$  seconds after it starts to move.



- (a) (i) Work out an estimate of the gradient of the graph at  $t = 3$   
You must show how you get your answer.

(3) 1 Q12ai

- (ii) What does this gradient represent?

longer the time, the higher the velocity

(1) 0 Q12aii

0 Q12b



- (b) Work out an estimate for the distance the particle travelled in the first 6 seconds.  
Use 3 strips of equal width.

..... m

(3)

(Total for Question 12 is 7 marks) **1**



13  $x = 0.\dot{2}$   $y = 0.6\dot{8}1$

1 Q13

Work out the value of  $xy$ .

Give your answer as a fraction in its simplest form.

$$x = 0.\dot{2}$$

$$10x = 2.2\dot{2}$$

$$y = 0.6\dot{8}1$$

$$10y = 6.81\dot{8}1$$

$$100y = 68.818\dot{1}$$

$$\begin{array}{r} 100y = 68.8181 \\ - 10y = 6.8181 \\ \hline 90y = 62.0 \end{array}$$

$$\begin{array}{r} 10x = 2.222 \\ - x = 0.222 \\ \hline 9x = 2.0 \end{array}$$

$$y = \frac{62}{90}$$

$$x = \frac{2}{9}$$

$$y = \frac{31}{45}$$

$$\frac{31}{45} \times \frac{2}{9} =$$

$$\frac{31}{45} \times \frac{10}{45} = \frac{310}{45} = \frac{61}{9}$$

$$\frac{31}{45} \times \frac{2}{9} = \frac{62}{405}$$

$$\frac{61}{9} = 6\frac{7}{9}$$

$$6\frac{7}{9}$$

(Total for Question 13 is 5 marks)

1



14 There are nine balls labelled 1 to 9 in a box.

0 Q14

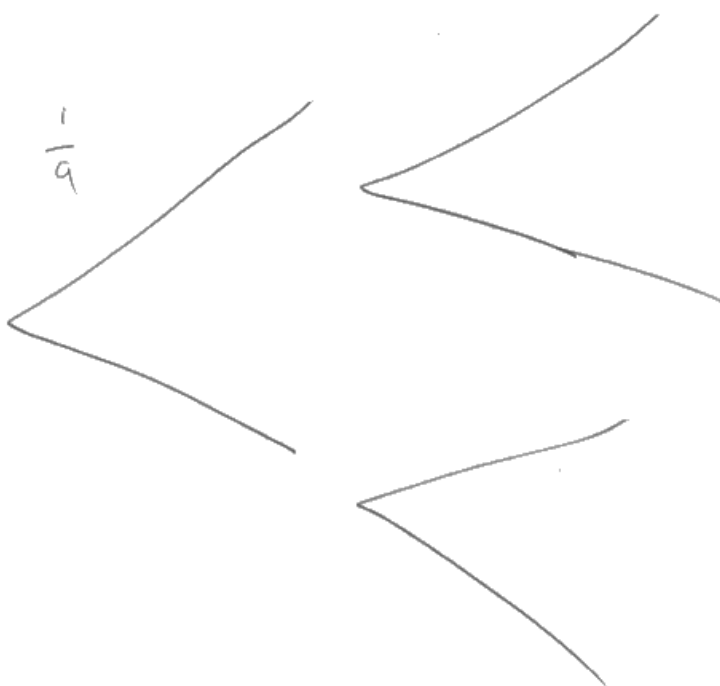
Lee will take at random two balls from the box.

Lee says,

“The probability that the sum of the numbers on the two balls will be an even number is greater than the probability that the product of the numbers will be an even number.”

Is Lee correct?

You must show how you get your answer.



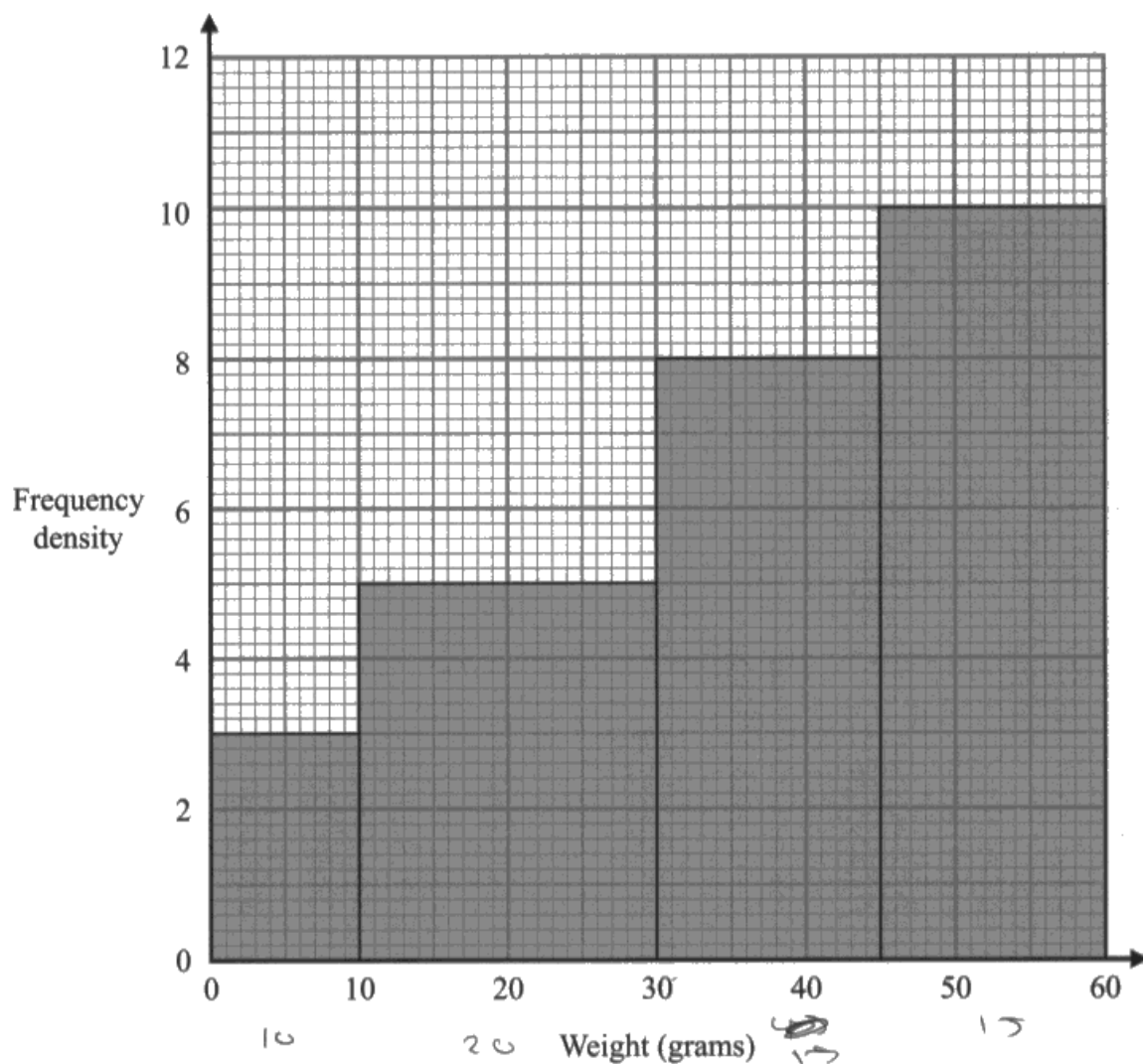
(Total for Question 14 is 5 marks)

0



15 The histogram gives information about the weights, in grams, of some biscuits.

0 Q15



One of these biscuits is taken at random.

Work out an estimate for the probability that the biscuit will have a weight between 20 grams and 40 grams.

$$\begin{array}{rcl}
 0-10 & = & 3 \\
 10-30 & = & 5 \\
 30-45 & = & 8 \\
 45-60 & = & 10 \\
 \hline
 & & 26
 \end{array}$$

(Total for Question 15 is 4 marks)

0



16 (a) Rationalise the denominator of  $\frac{35}{\sqrt{7}}$

Give your answer in its simplest form.

$$\frac{35}{7\sqrt{7}} = \frac{35}{5\sqrt{7}} = \frac{7}{\sqrt{7}}$$

(2) Q16a

$\frac{\sqrt{27}-1}{2-\sqrt{3}}$  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  $b$ .

$$\frac{\sqrt{27}-1}{2-\sqrt{3}} = \frac{3\sqrt{3}-1}{2-\sqrt{3}} = \frac{3\sqrt{3}-1}{2-\sqrt{3}}$$

$$\frac{\sqrt{3 \times 9} - 1}{2 - \sqrt{3}}$$

$a =$  .....

$b =$  .....

(4) Q16b

(Total for Question 16 is 6 marks)

1

Turn over for Question 17



17  $g(x) = 1 - 3x$     $h(x) = 2x^2 - 1$

0 Q17

Show that  $3gh(x) + hg(x) = 0$  has just one solution for  $x$ .

(Total for Question 17 is 5 marks)

0

**TOTAL FOR PAPER IS 80 MARKS**

