

# GCSE Mathematics

## Practice Tests: Set 4

### Paper 2F (Calculator)

**Time: 1 hour 30 minutes**

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

#### 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.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



#### Information

- The total mark for this paper is 80
- 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

# Simplifying Algebraic Expressions

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Simplify  $3 \times a \times 5 \times b$

$$= 15 \times a \times b$$

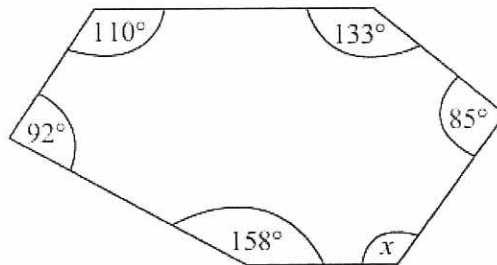
$$= \underline{\underline{15ab}}$$

$$\underline{\underline{15ab}}$$

(Total 1 mark)

2. Here is a hexagon.

Forming and Solving Equations



The angles of a hexagon add up to  $720^\circ$ .

Work out the size of the angle marked  $x$ .

$$\begin{array}{l} \text{collect} \\ (-578^\circ) \end{array} \left| \begin{array}{l} 92^\circ + 110^\circ + 133^\circ + 85^\circ + 158^\circ + x^\circ = 720^\circ \\ 578^\circ \\ \hline x^\circ = 142^\circ \end{array} \right.$$

$$\underline{\underline{142^\circ}}$$

(Total 2 marks)

# Combinations

3. The table shows the names of five of Janette's friends.

Boys	Girls
Dodi	Anna
James	Michelle
William	

Janette is going to play a team game.  
She chooses one of the boys and one of the girls to be in her team.

Write down all the possible combinations Janette can choose.

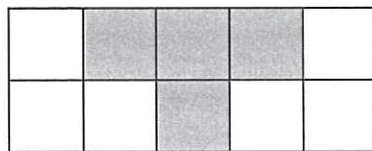
*(D, A), (D, M), (J, A), (J, M), (W, A), (W, M)*

.....

.....

(Total 2 marks)

4.



*Converting Percentages / fractions / decimals*

(i) What percentage of this shape is shaded?

$$= 4 \text{ out of } 10 = \frac{4}{10} = 40\%$$

..... *40* %

(ii) Write your answer to part (i) as a decimal.

$$40\% = \frac{4}{10} = \underline{0.4}$$

..... *0.4*

(Total 2 marks)

# Single Event Probability

5. Here are some words that can be used to describe the probability that an event will happen.

certain      impossible      likely      unlikely      evens

(a) Write down the word that best describes the probability

(i) that you will win a raffle when 400 tickets are sold and you have 10 of the tickets,

Unlikely

(ii) that you get a 10 when you roll an ordinary dice.

Impossible

(2)

Ayesha is making a fair 8-sided spinner.

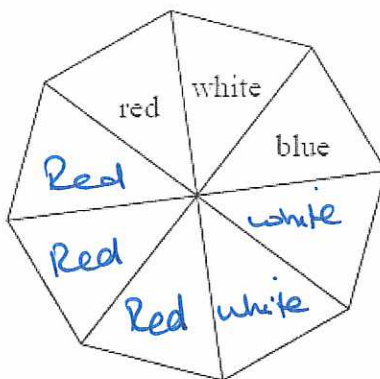
The spinner already has the colours red, white and blue written on it.

The probability that the spinner lands on red will be  $\frac{1}{2}$   $\therefore$  Red must be 4 spaces.

The probability that the spinner lands on blue will be less than the probability that the spinner lands on white.

$\therefore$  More white than blue

(b) Complete the spinner by writing on it the colours that are missing.



(2)

(Total 4 marks)

## Fractions and Percentages of an Amount

6. There are 400 counters in a bag.

36% of the counters are yellow.

$\frac{2}{5}$  of the counters are blue.

The rest of the counters are green.

Work out how many counters are green.

Yellow:

$$36\% \text{ of } 400 = 0.36 \times 400 = 144$$

Blue:

$$\frac{2}{5} \text{ of } 400 = \frac{2}{5} \times 400 = 80$$

Green:

$$400 - 144 - 80 = \underline{\underline{176}}$$

176

.....  
(Total 4 marks)

## Scale Ratios

7. The length of a bus is 10 metres.  $\rightarrow 10\text{m} = 1000\text{cm}$

Gurjeet makes a model of the bus.

He uses a scale of 1 cm to 40 cm.

Work out the length of the model of the bus.

Give your answer in centimetres.

Ratio	model	Reality
	1 cm	40 cm
	<u>25 cm</u>	1000 cm

$$(1000 \div 40 = 25)$$

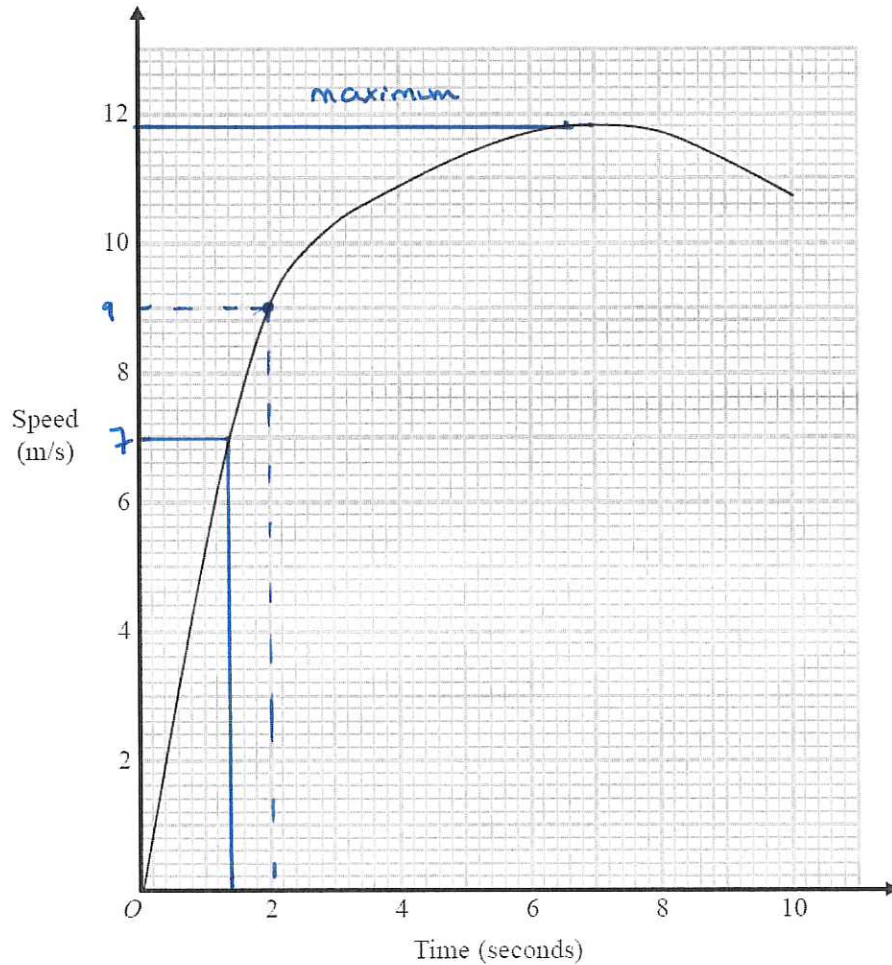
..... 25 cm

(Total 2 marks)

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## Interpreting Speed-Time (velocity-time) Graphs

8. Usain runs in a race.  
The graph shows his speed, in metres per second (m/s), during the first 10 seconds of the race.



- (a) Write down Usain's speed at 2 seconds.

..... 9 ..... m/s  
(1)

- (b) Write down Usain's greatest speed.

..... 11.8 ..... m/s  
(1)

- (c) Write down the time at which Usain's speed was 7 m/s.

..... 1.4 ..... seconds  
(1)

**(Total 3 marks)**

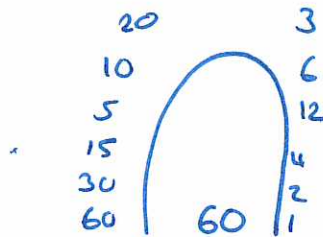
# Factors

9. Michael writes down 4 different factors of 60

He adds the 4 factors together.

He gets a number greater than 20 but less than 35

What 4 factors could Michael have written down?

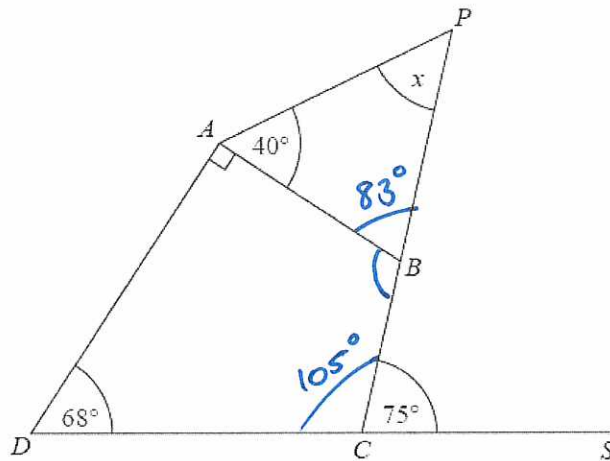


..... 20      1      2      3 .....

(Total 3 marks)



10.



$ABCD$  is a quadrilateral.  
 $DCS$  and  $PBC$  are straight lines.

- Angle  $BAD = 90^\circ$
- Angle  $ADC = 68^\circ$
- Angle  $PAB = 40^\circ$
- Angle  $PCS = 75^\circ$

Work out the size of the angle marked  $x$ .  
 Give reasons for your answer.

$$\begin{aligned} \widehat{DCB} &= 180^\circ - 75^\circ = 105^\circ \\ \widehat{ABC} &= 360^\circ - 90^\circ - 68^\circ - 105^\circ \\ &= 97^\circ \\ \widehat{APB} &= 180^\circ - 97^\circ = 83^\circ \\ \widehat{APB} &= 180^\circ - 40^\circ - 83^\circ \\ &= \underline{\underline{57^\circ}} \end{aligned}$$

Angles on a straight line =  $180^\circ$   
 Angles in a quadrilateral =  $360^\circ$   
 Angles on a straight line =  $180^\circ$   
 Angles in a triangle =  $57^\circ$

(Total 4 marks)

# Averages From Raw Data

11. Mr Smith kept a record of the number of absences for each student in his class for one term. Here are his results.

0 0 0 8 4 5 5 3 2 1

- (a) Write down the mode.

↓  
most frequent

..... 0  
(1)

- (b) Work out the mean.

↓  
add all up  
how many

$$= \frac{0+0+0+8+4+5+5+3+2+1}{10}$$

$$= \frac{28}{10} = \underline{\underline{2.8}}$$

(2)

(Total 3 marks)

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# Using Formulae (Forming and Solving Equations)

12. You can use this rule to work out the total cost, in pounds, of hiring a pressure washer.

Multiply the number of days by 5.4 and then add 15

Ali hires a pressure washer.  
The total cost is £52.80

(a) Work out how many days Ali hires the pressure washer for.

$$\begin{array}{l|l}
 \text{Cost} = \text{days} \times 5.4 + 15 & 52.80 = 5.4d + 15 \\
 (-15) & 37.80 = 5.4d \\
 (\div 5.4) & \underline{7} = d \quad \dots\dots\dots 7 \text{ days} \\
 & \hspace{15em} (2)
 \end{array}$$

Ben hires a pressure washer for  $y$  days.  
The total cost is £ $C$ .

(b) Write down a formula for  $C$  in terms of  $y$ .

$$\begin{array}{l|l}
 \text{Cost} = \text{days} \times 5.4 + 15 & C = y \times 5.4 + 15 \\
 & C = \underline{5.4y} + 15 \quad \dots\dots\dots (2)
 \end{array}$$

(Total 4 marks)

# Conversion Graphs

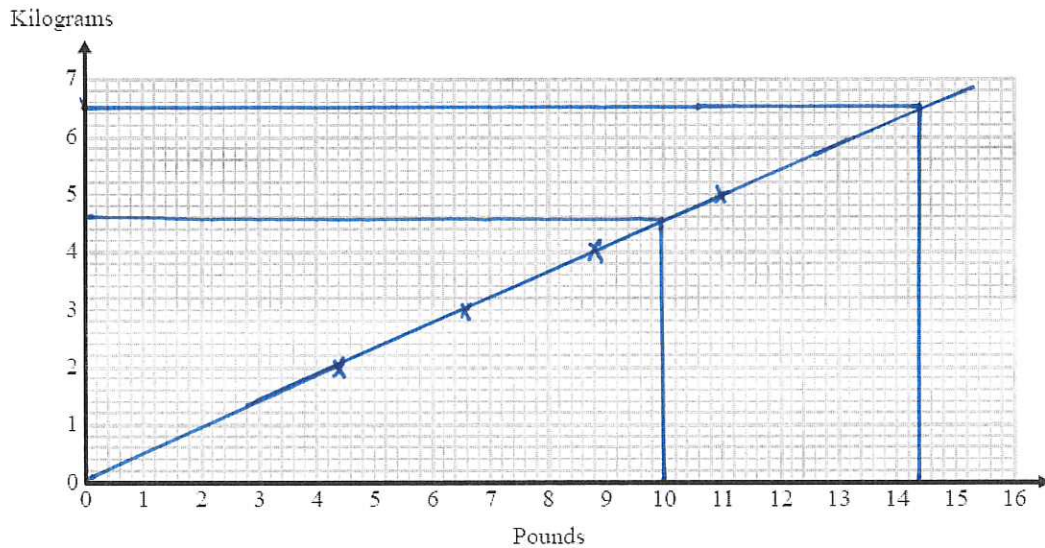
13. Mary works in a maternity unit. She weighs the babies.

The table shows some weights in both pounds and kilograms.

pounds	4.4	6.6	8.8	11	13.2	15.4
kilograms	2	3	4	5	6	7

PLOT COORDINATES

- (a) Use this table to draw a conversion graph to change between pounds and kilograms.



(2)

- (b) Change 10 pounds to kilograms.

..... 4.6 ..... kilograms  
(1)

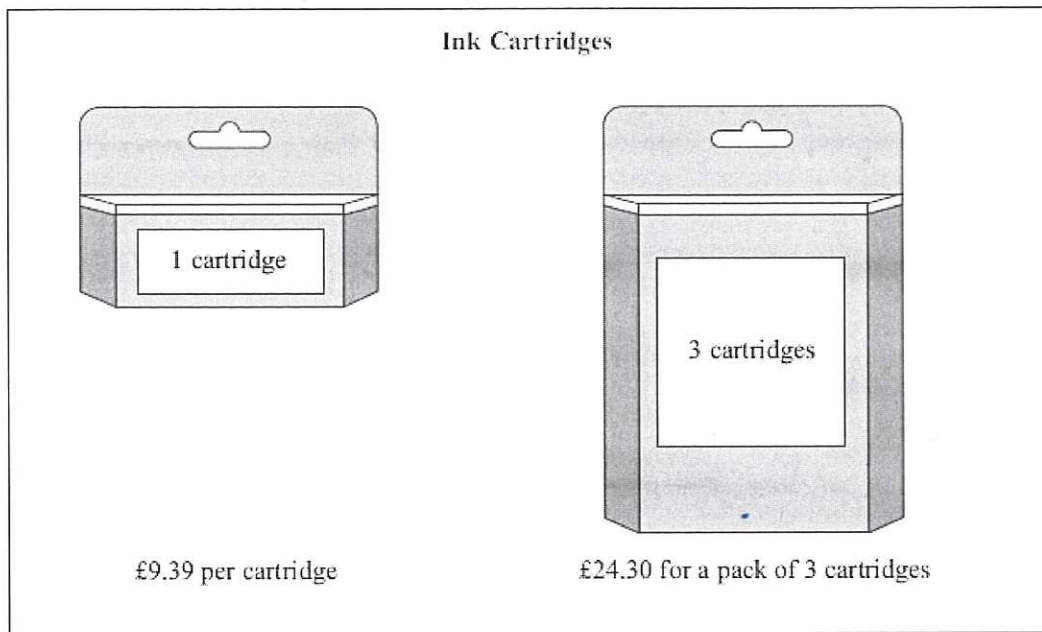
- (c) Change 6.5 kilograms to pounds.

..... 14.4 ..... pounds  
(1)

(Total 4 marks)

# Best Buy

14. George is going to buy exactly 10 ink cartridges.



Find the difference in cost between the cheapest way and the most expensive way to buy the 10 ink cartridges.

10 lots of 1 packs:

$$10 \times \pounds 9.39 = \underline{\underline{\pounds 93.90}}$$

4 lots of 3 packs:

CANNOT HAPPEN SINCE HE BUYS EXACTLY 10

3 lots of 3 packs  
+ 1 lot of 1 pack

$$\begin{array}{r} 3 \times \pounds 24.30 \\ + 1 \times \pounds 9.39 \\ \hline = \pounds 72.90 \oplus \pounds 9.39 \oplus \\ \hline \underline{\underline{\pounds 82.29}} \end{array}$$

Difference in cost

$$\pounds 93.90 - \pounds 82.29 = \underline{\underline{\pounds 11.61}}$$

£11.61

(Total 5 marks)

# Worded Simultaneous Equations

15. Henri and Ray buy some flowers for their mother.

They buy

3 bunches of roses for £6.99

1 bunch of roses and 2 bunches of tulips for £4.45

- (a) Work out the cost of one bunch of tulips.

$$\begin{array}{l|l}
 (\div 3) & 3 \text{ roses} = \pounds 6.99 \\
 & 1 \text{ roses} = \pounds 2.33 \\
 & 1 \text{ roses} + 2 \text{ tulips} = \pounds 4.45 \\
 & \pounds 2.33 + 2 \text{ tulips} = \pounds 4.45 \\
 (-\pounds 2.33) & 2 \text{ tulips} = \pounds 2.12 \\
 (\div 2) & 1 \text{ tulip} = \underline{\pounds 1.06}
 \end{array}$$

(3)

Henri and Ray share the total cost of £11.44 in the ratio 5:3

Sharing Ratio

- (b) Work out how much Henri pays and how much Ray pays.

$$\begin{array}{l|l}
 (\div 8) & 5+3 = 8 \text{ parts} \\
 & \pounds 11.44 = 8 \text{ parts} \\
 & \pounds 1.43 = 1 \text{ part} \\
 \text{Henri} = 5 \text{ parts} & \\
 (\times 5) & \pounds 7.15 = 5 \text{ parts} \\
 \text{Ray} = 3 \text{ parts} & \\
 (\times 3) & \pounds 4.29 = 3 \text{ parts}
 \end{array}$$

Henri £.....	7.15
Ray £.....	4.29

(3)

(Total 6 marks)

# Percentages of an Amount

16. Brian wants to go on holiday.  
He is going to take out a loan of £500 to help pay for the holiday.

Brian will have to pay back the £500 plus 20% interest over 12 months.  
He will pay back the same amount of money each month.

How much money will he need to pay back each month?

20% interest	$£500 \times 0.2 = £600$
Per month payment	$£600 \div 12 = \underline{\underline{£50}}$

£ 50 .....

(Total 4 marks)

~~SOLUTION~~

Pythagoras

17.

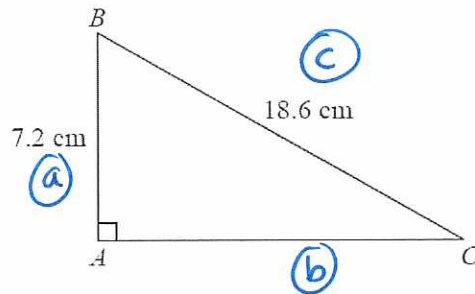


Diagram NOT  
accurately drawn

Calculate the length of AC.  
Give your answer correct to 3 significant figures.

~~SOLUTION~~  
Pythagoras

$$(-7.2^2)$$

$\sqrt{\text{ANS}}$

$$a^2 + b^2 = c^2$$

$$7.2^2 + b^2 = 18.6^2$$

$$b^2 = 18.6^2 - 7.2^2 = 294.12$$

b

$$= 17.149927...$$

$$\dots = 17.1 \dots \text{ cm}$$

(3 s.f.)

(Total 3 marks)



## Forming and Solving Equations

18. Chris has two children, Beth and Amy.  
Beth is 10 years older than Amy.

Chris says,

“I am twice as old as the sum of Beth’s age and Amy’s age.”

Chris is 40 years old.

How old is Amy?

$$\text{Amy} = x$$

$$\text{Beth} = x + 10$$

$$\text{Chris} = 2(\text{Amy} + \text{Beth}) \Rightarrow \text{Chris} = 2(x + x + 10)$$

$$\text{Chris} = 40$$

$$40 = 2(x + x + 10)$$

collect

$$40 = 2(2x + 10)$$

expand

$$40 = 4x + 20$$

(-20)

$$20 = 4x$$

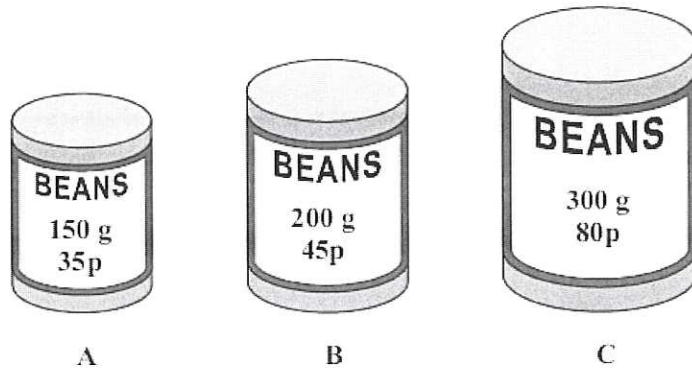
( $\div 4$ )

$$\underline{\underline{5}} = x = \text{Amy}$$

.....<sup>5</sup>.....years old  
(Total 4 marks)

# Best Buy

19. A shop sells tins of beans in three different sizes.



Kathy wants to buy exactly 750 g of beans.  
She wants to buy the beans at the cheapest possible cost.

Work out the cheapest cost.  
You must show all your working.

Best value for money:

LOGIC

$$200\text{g} = 45\text{p}, 150\text{g} = 35\text{p}$$

$$\underline{A}: 150\text{g} \div 35\text{p} = 4.286 \text{ g per pence}$$

$$\underline{B}: 200\text{g} \div 45\text{p} = 4.444 \text{ g per pence}$$

$$\underline{C}: 300\text{g} \div 80\text{p} = 3.75 \text{ g per pence}$$

$\therefore$  WE WANT AS MANY 200g TINS AS POSSIBLE.

$$\therefore \underline{3} \text{ 200g TINS} + 1 \text{ 150g TIN}$$

$$= 3 \times 45\text{p} + 1 \times 35\text{p}$$

$$= \pounds 1.35 + \pounds 0.35$$

$$= \underline{\underline{\pounds 1.70}}$$

(Total 4 marks)

10. Joe and Ann buy some fruit from the same shop.

Joe buys 4 apples and 3 bananas for £2.50.

Ann buys 3 apples and 4 bananas for £2.40.

Work out the cost of

(i) one apple,

(ii) one banana.

$$\textcircled{1} \quad 4a + 3b = 2.50$$

$$\textcircled{2} \quad 3a + 4b = 2.40$$

$$\textcircled{3} \quad 12a + 9b = 7.50$$

$$\textcircled{4} \quad 12a + 16b = 9.60$$

$$\textcircled{4} \quad 12a + 16b = 9.60$$

$$\textcircled{-} \quad \textcircled{3} \quad 12a + 9b = 7.50$$

---


$$7b = 2.10$$

$$b = 0.30$$

$$4a + 3b = 2.50$$

$$4a + 3(0.30) = 2.50$$

$$4a + 0.90 = 2.50$$

$$4a = 1.60$$

$$a = 0.40$$

$$\textcircled{1} \times 3 \quad :$$

$$\textcircled{2} \times 4 \quad :$$

$$\textcircled{4} - \textcircled{3} \quad :$$

$$(\div 7)$$

Substitute in  $\textcircled{1}$ :

$$(-0.90)$$

$$(\div 4)$$

(i) one apple ..... 40 ..... p

(ii) one banana ..... 30 ..... p

**(Total 5 marks)**

## Set Notation

6.  $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{\text{even numbers}\}$

$B = \{\text{multiples of 3}\}$

(a) List the members of set  $B$ .

3, 6, 9

(1)

(b) Find  $A \cup B$

OR

$A = \{2, 4, 6, 8, 10\}$

$B = \{3, 6, 9\}$

2, 3, 4, 6, 8, 9, 10

(1)

(c) Find  $A \cap B$

AND

6

(1)

$x$  is a member of  $\mathcal{E}$

$x \in B$

$x \notin A$

(d) What are the possible values of  $x$ ?

$x \in B \Rightarrow \{3, 6, 9\}$

$x \notin A \Rightarrow \{\text{odd}\} = \{1, 3, 5, 7, 9\}$

$x = 3 \text{ or } 9$

(2)

(Total 5 marks)

## Reverse %

4. Neville saw this car for sale.

He got a discount of 25% off the price of the car.  
He paid £7200 for the car.

Work out the price of the car before the discount.

$$\begin{array}{l} (\div 75) \\ (\times 100) \end{array} \left| \begin{array}{l} 100\% = ? \\ 100\% - 25\% = \cancel{7200} \\ 75\% = \pounds 7200 \\ 1\% = \pounds 96 \\ 100\% = \pounds 9600 \end{array} \right.$$

£ 9600 .....

(Total 3 marks)

# Sampling

8. Keith, Ben and Liz tested a coin to find out if it was biased. They each threw the coin a number of times. They counted the number of heads and the number of tails they each got. The table gives information about their results.

	Keith	Ben	Liz
Number of heads	12	34	57
Number of tails	28	66	243

- (a) Which person, Keith, Ben or Liz, will have the best estimate for the probability of getting a head on this coin? Explain your answer.

Liz since she performed the most trials. Her answers are more ~~likely~~<sup>reliable</sup> as a result.

(1)

- (b) Using all the results in the table, work out an estimate for the probability that the next throw of the coin will be a head.

$$\text{Number of heads} = 12 + 34 + 57 = 103$$

$$\text{Number of tails} = 28 + 66 + 243 = 337$$

$$P(\text{head}) = \frac{\text{Number of heads}}{\text{Total Throws}} = \frac{103}{337+103} = \frac{103}{440} = 0.234 \text{ (3 d.p.)}$$

0.234

(2)

(Total 3 marks)