Chhetri Academy

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GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 11

Algebraic notation, substitution and identities

Foundation tier

Past paper question booklet

150	2011-2025	Foundation
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

13 Jake plays a game of throwing a ball at a target.

The table shows information about the probability of each possible score.

Score	0	1	2	3	4	5
Probability	0.09	x	0.18	0.16	0.21	0.30

Work out the value of x.

.....

(Total for Question 13 is 2 marks)

5

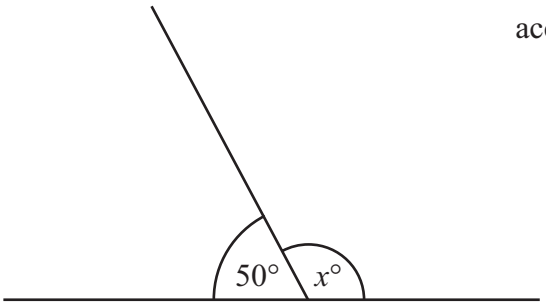


Diagram **NOT** accurately drawn

(i) Work out the value of x.

$x =$ .....

(ii) Give a reason for your answer.

.....

.....

(Total for Question 5 is 2 marks)

6 (a) Simplify $c + c + c$

.....

(1)

(b) Simplify $4x + 5y - 2x + y$

.....

(2)

(Total for Question 6 is 3 marks)

13 Denzil has a 4-sided spinner.
The sides of the spinner are numbered 1, 2, 3 and 4
The spinner is biased.

The table shows each of the probabilities that the spinner will land on 1, on 3 and on 4
The probability that the spinner will land on 3 is x.

Number	1	2	3	4
Probability	0.3		x	0.1

(a) Find an expression, in terms of x, for the probability that the spinner will land on 2
Give your answer in its simplest form.

.....

(2)

Denzil spins the spinner 300 times.

(b) Write down an expression, in terms of x, for the number of times the spinner is likely to land on 3

.....

(1)

(Total for Question 13 is 3 marks)

4 (a) Simplify $d + d + d + d$

.....

(1)

(b) Simplify $3f + 4 - 2f + 6$

.....

(2)

(Total for Question 4 is 3 marks)

Question 06

16 Julie is x years old.
Kevin is $x + 3$ years old.
Omar is $2x$ years old.

Write an expression, in terms of x, for the mean of their ages.

.....

(Total for Question 16 is 2 marks)

12 Simplify

$$3x + 5y + x + 4y$$

.....

(Total for Question 12 is 2 marks)

***14** This formula is used to work out the body mass index, B, for a person of mass M kg and height H metres.

$$B = \frac{M}{H^2}$$

A person with a body mass index between 25 and 30 is overweight.

Arthur has a mass of 96 kg.
He has a height of 2 metres.

Is Arthur overweight?
You must show all your working.

(Total for Question 14 is 3 marks)

15 The diagram shows **shape A.**
All the measurements are in centimetres.

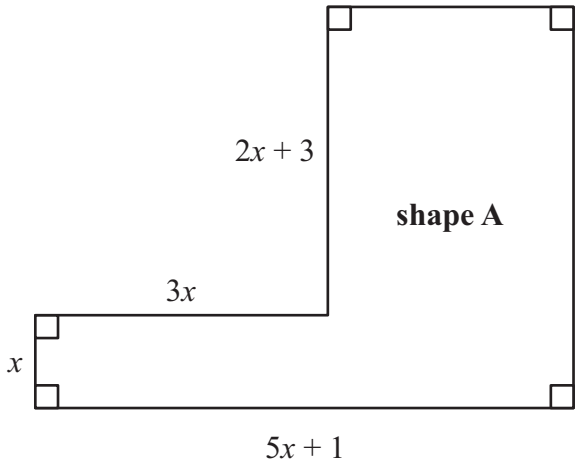


Diagram **NOT** accurately drawn

(a) Find an expression, in terms of x, for the perimeter of **shape A**.

.....

(3)

A square has the same perimeter as **shape A**.

(b) Find an expression, in terms of x, for the length of one side of this square.

.....

(1)

(Total for Question 15 is 4 marks)

5 (a) Simplify $g + g + g + g + g$

.....

(1)

(b) Simplify $7m - 3m$

.....

(1)

(c) Simplify $4e \times 5f$

.....

(1)

(Total for Question 5 is 3 marks)

15 The table shows the minimum distance and the maximum distance people should sit from different sized TV screens when watching TV.

TV screen size (inches)	Minimum distance (feet)	Maximum distance (feet)
28	3.5	7
30	3.75	7.5
32	4	8
36	4.5	9
38	4.75	9.5
40	5	10
42	5.25	10.5

James has a TV with a screen size of 32 inches.
He is going to watch his TV.

(a) What is the minimum distance James should sit from the screen?

..... feet
(1)

Sheraz has a TV with a screen size of 38 inches.
He is going to watch his TV.

(b) Work out the difference between the minimum distance and the maximum distance Sheraz should sit from the screen.

..... feet
(2)

You can use this rule to work out the maximum distance to sit from a TV screen.

Maximum distance in feet = screen size in inches ÷ 4

Clare has a TV with a screen size of 24 inches.
She is going to watch her TV.

(c) Use the rule to work out the maximum distance Clare should sit from the screen.

..... feet
(1)

Richard should sit a maximum distance of 12 feet from his screen.

(d) Work out the screen size of Richard's TV.

..... inches
(2)

(Total for Question 15 is 6 marks)

26



Take **two** 5 m*l* spoons full
twice a day

There are 300 m*l* of medicine in a bottle.
Mary has to take two 5 m*l* spoons full of medicine twice a day.

Mary has to take the medicine until the bottle is empty.

(a) How many days does Mary have to take the medicine for?

..... days
(3)

You can work out the amount of medicine, c m*l*, to give to a child by using the formula

$$c = \frac{ma}{150}$$

m is the age of the child, in months.
a is an adult dose, in m*l*.

A child is 30 months old.
An adult's dose is 40 m*l*.

(b) Work out the amount of medicine you can give to the child.

..... m*l*
(2)

(Total for Question 26 is 5 marks)

6 (a) Simplify $c + c + c$

.....

(1)

(b) Simplify $2e \times 3f$

.....

(1)

(c) Simplify $9p + 2t - 2p + 3t$

.....

(2)

(Total for Question 6 is 4 marks)

14 $P = 3.5x - y$

(a) Work out the value of P when $x = 12$ and $y = 5$

.....

(2)

(b) Work out the value of P when $x = -9$ and $y = -6$

.....

(2)

(Total for Question 14 is 4 marks)

10 Abigail is a years old.
Bob is b years old.

Bob is older than Abigail.

(a) Write down, in terms of a and b, an expression for how many years older Bob is than Abigail.

.....

(1)

(b) Write down, in terms of a and b, an expression for the mean age, in years, of Abigail and Bob.

.....

(1)

(Total for Question 10 is 2 marks)

Question 16

3 (a) Simplify $p + p + p + p + p$

.....

(1)

(b) Simplify $r \times s \times 4$

.....

(1)

(c) Simplify $2a + 3b + 5a - b$

.....

(2)

(Total for Question 3 is 4 marks)

12 Hayley is buying bottles of juice for a children's party.

She uses this rule to work out the number of bottles of juice she needs.

Number of bottles = Number of children ÷ 4 + 5

There will be 24 children at the party.

(a) Work out the number of bottles of juice Hayley needs.

.....

(2)

Hayley needs 13 bottles of juice for a different children's party.
She used the same rule.

(b) Work out the number of children at this party.

.....

(3)

(Total for Question 12 is 5 marks)

13 (a) Simplify $f + f + f + f - f$

.....

(1)

(b) Simplify $2m \times 3$

.....

(1)

(c) Simplify $3a + 2h + a + 3h$

.....

(2)

(Total for Question 13 is 4 marks)

***19**

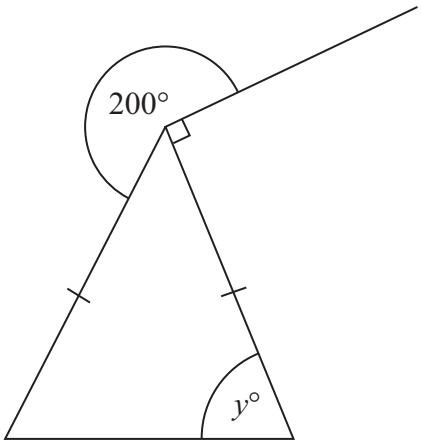
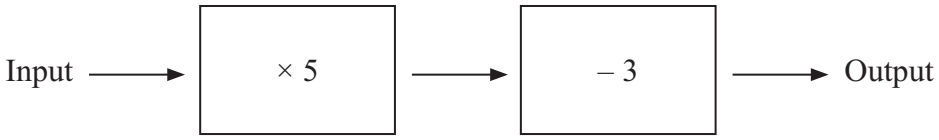


Diagram **NOT** accurately drawn

Work out the value of y.
Give reasons for your answer.

(Total for Question 19 is 4 marks)

4 Here is a two-stage number machine.
It multiplies by 5 and then subtracts 3

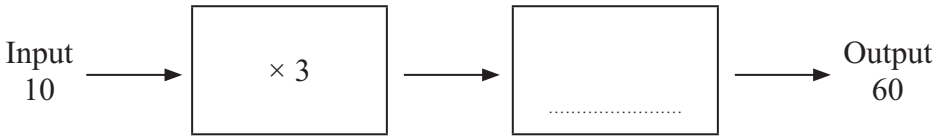


(a) Complete the table.

Input	Output
1	2
2	7
5	22
7	.....
.....	47

(2)

Here is a different two-stage number machine.



When the input is 10, the output is 60

(b) Complete the number machine.

(1)

(Total for Question 4 is 3 marks)

10 You can use this rule to work out the total charge for hiring a concrete mixer.

Total charge = £30 plus £8 each day

Esme hired a concrete mixer for 4 days.

(a) Work out the total charge.

£ .....

(2)

William also hired a concrete mixer.

The total charge was £110

(b) Work out how many days William hired the concrete mixer for.

..... days

(3)

(Total for Question 10 is 5 marks)

18 $y = 4x + c$

$x = 7.5$

$c = 5.4$

(a) Work out the value of y.

.....

(2)

$y = 4x + c$

$y = 18.8$

$c = -2.4$

(b) Work out the value of x.

.....

(2)

(Total for Question 18 is 4 marks)

9 (a) Simplify $t + t + t$

.....

(1)

(b) Simplify $3 \times w \times 2$

.....

(1)

(c) Simplify $5mn - 3mn$

.....

(1)

(Total for Question 9 is 3 marks)

12 $p = 5s - 2t$

$s = 4$
$t = 3$

(a) Work out the value of p.

$p =$ .....
(2)

$y = x^2$
$x = -5$

(b) Work out the value of y.

$y =$ .....
(1)

(Total for Question 12 is 3 marks)

9 This rule can be used to work out the time, in seconds, it takes to download music tracks.

Time = 25 × number of music tracks + 10

(a) Work out the time, in seconds, it takes to download 9 music tracks.

..... seconds
(2)

(b) How many music tracks can be downloaded in 360 seconds?

.....
(3)

(Total for Question 9 is 5 marks)

18 Brian is x years old.
Peter is 4 years older than Brian.
Amy is 2 years younger than Brian.

The total of their ages is 26 years.

Work out the value of x.

.....

(Total for Question 18 is 4 marks)

9 (a) Simplify $a + a + a + a$

.....
(1)

(b) Simplify $3 \times c \times d$

.....
(1)

(c) Simplify $3ef + 5ef - ef$

.....
(1)

(d) Solve $6g = 18$

$g =$ .....
(1)

(e) Solve $5h + 7 = 17$

$h =$ .....
(2)

(Total for Question 9 is 6 marks)

Question 28

14 Katie has x pets.
Agatha has twice as many pets as Katie.
Isabel has 3 more pets than Katie.

Write an expression, in terms of x, for the total number of pets that Katie, Agatha and Isabel have.

.....

(Total for Question 14 is 2 marks)

Question 29

12 (a) Simplify $y + y + y + y + y$

.....

(1)

(b) Simplify $5 \times 2k$

.....

(1)

(Total for Question 12 is 2 marks)

12 (a) Solve $a + a = 18$

$a =$ .....
(1)

(b) Solve $b - 4 = 8$

$b =$ .....
(1)

(c) Solve $7c = 28$

$c =$ .....
(1)

$P = 2x + 3y$
$x = 5$
$y = 4$

(d) Work out the value of P.

$P =$ .....
(2)

(Total for Question 12 is 5 marks)

18 $f = 8$

(a) Work out the value of $2f + 7$

.....

(2)

$T = 3g + 5h$

$g = -2$

$h = 4$

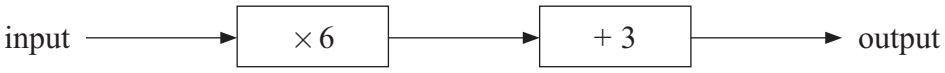
(b) Work out the value of T.

.....

(2)

(Total for Question 18 is 4 marks)

15 Here is a number machine.



Complete this table for the number machine.

Input	Output
0.5	.....
2	15
3	.....
.....	33

(Total for Question 15 is 3 marks)

Question 33

4 (a) Simplify $m + m + m + m + m$

.....

(1)

(b) Simplify $2p + 7p$

.....

(1)

(c) Simplify $t \times w \times 4$

.....

(1)

(Total for Question 4 is 3 marks)

8 $a = 4b$

(a) Work out the value of a when $b = 3$

$a =$ .....

(1)

$P = 4d - 3$

(b) Work out the value of P when $d = 2$

$P =$ .....

(2)

(Total for Question 8 is 3 marks)

***14** Angela and Michelle both work as waitresses at the same restaurant.

This formula is used to work out the total amount of money each waitress gets.

Total amount = £6.50 × number of hours worked + tips

The table shows the number of hours Angela and Michelle each worked last Saturday.
It also shows the tips they got.

	Number of hours worked	**Tips**
Angela	8	£12
Michelle	7	£15

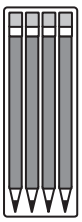
Who got the higher total amount of money last Saturday?
You must show clearly how you got your answer.

(Total for Question 14 is 4 marks)

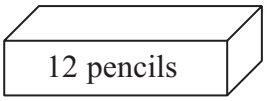
10 A shop sells pencils in packs and in boxes.

There are

4 pencils in a pack
and 12 pencils in a box.



pack



box

Lola buys d packs of pencils.

(a) Write down an expression, in terms of d, for the number of pencils Lola buys.

.....

(1)

Rory buys x packs of pencils and y boxes of pencils.

(b) Write down an expression, in terms of x and y, for the total number of pencils Rory buys.

.....

(2)

(Total for Question 10 is 3 marks)

5 (a) Simplify $y + y + y + y$

.....

(1)

(b) Simplify $c \times d \times 5$

.....

(1)

(c) Simplify $2a + 4b + 3a - b$

.....

(2)

(Total for Question 5 is 4 marks)

11 (a) Simplify $b + b + b + b$

.....

(1)

(b) Simplify $8n - 3n$

.....

(1)

(c) Simplify $3 \times c \times d$

.....

(1)

(d) Simplify $3x + 7y + 2x - y$

.....

(2)

(Total for Question 11 is 5 marks)

10 Here is a number machine.



Complete this table for the number machine.

Input	Output
8	9
12	.....
.....	27

(Total for Question 10 is 2 marks)

20 Pat has x cards.

Jim has 4 more cards than Pat.

(i) Write down an expression, in terms of x, for the number of cards Jim has.

.....

Lex has 2 times as many cards as Pat.

(ii) Write down an expression, in terms of x, for the number of cards Lex has.

.....

(Total for Question 20 is 2 marks)

8 There are only yellow pencils, red pencils, green pencils and blue pencils in a box.

The pie chart gives information about the numbers of pencils of each colour.

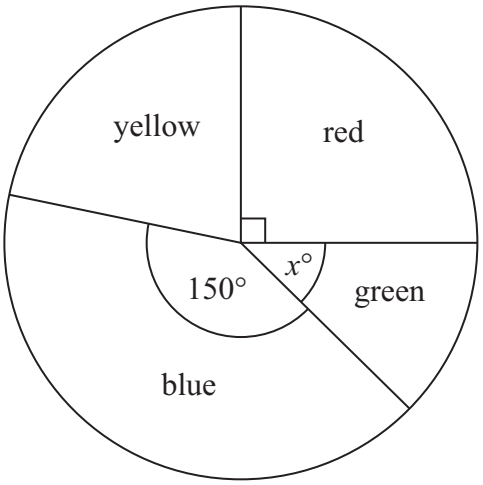


Diagram **NOT** accurately drawn

(a) What fraction of the total number of pencils in the box is red?

.....

(1)

In the pie chart, the angle used for yellow is twice the angle used for green.

(b) Write down an expression, in terms of x, for the angle used for yellow.

.....

(1)

There are 48 pencils in the box.

(c) Work out the number of blue pencils in the box.

.....

(2)

(Total for Question 8 is 4 marks)

12 Tim plays a game.
He can win the game or he can lose the game or he can draw the game.

The probability that Tim will win the game is 0.25
The probability that Tim will lose the game is x.

(a) Give an expression, in terms of x, for the probability that he will draw the game.

.....

(2)

Tim plays the game 240 times.

(b) Work out an estimate for the number of times he will win the game.

.....

(2)

(Total for Question 12 is 4 marks)

Question 43

5 (a) Simplify $p + 2p$

.....

(1)

(b) Simplify $4 \times 2t$

.....

(1)

(Total for Question 5 is 2 marks)

12 (a) Simplify $a \times c \times 3$

.....

(1)

(b) Simplify $p \times p \times p$

.....

(1)

(c) Simplify $5x - 4y + 3x - 3y$

.....

(2)

(Total for Question 12 is 4 marks)

18 $x = -5$
$y = 2$

(a) Work out the value of $3x + 4y$

.....

(2)

Janet buys p packets of sweets.
There are 10 sweets in each packet.

(b) (i) Write down an expression, in terms of p, for the total number of sweets Janet buys.

.....

Janet eats 7 of the sweets.

(ii) Write down an expression, in terms of p, for the number of sweets Janet has now.

.....

(2)

(Total for Question 18 is 4 marks)

23 (a) Work out the value of 3.1^4

.....

(1)

(b) Simplify $(p^3)^2$

.....

(1)

(c) Simplify $\frac{t^8}{t^3}$

.....

(1)

$2^3 \times 2^n = 2^9$

(d) Work out the value of n.

.....

(1)

(Total for Question 23 is 4 marks)

15 There are 20 sweets in a box.
x of the sweets are red.
The rest of the sweets are yellow.

Tom takes at random a sweet from the box.

Write down an expression, in terms of x, for the probability that Tom takes a yellow sweet.

.....

(Total for Question 15 is 2 marks)

10 (a) Simplify $5a - 2a$

.....

(1)

(b) Simplify $3 \times 4y$

.....

(1)

(c) Simplify $3e + 4f + 2e - f$

.....

(2)

(Total for Question 10 is 4 marks)

Question 49

12 (a) Simplify $x^2 \times x^4$

.....

(1)

(b) Simplify $y^8 \div y^6$

.....

(1)

(Total for Question 12 is 2 marks)

Question 50

12 $P = n + 2t$

$n = 4$

$t = 5$

Work out the value of P.

$P =$ .....

(Total for Question 12 is 2 marks)

22 Stephanie is x years old.
Tobi is twice as old as Stephanie.
Ulrika is 3 years younger than Tobi.

The sum of all their ages is 52 years.

(a) Show that $5x - 3 = 52$

(3)

(b) Work out the value of x.

$x =$ .....

(2)

(Total for Question 22 is 5 marks)

14 Dan, Harry and Regan sell cars.

Dan sells x cars.
Harry sells 5 more cars than Dan.
Regan sells twice as many cars as Dan.

Write an expression, in terms of x, for the mean number of cars Dan, Harry and Regan sell.

.....

(Total for Question 14 is 2 marks)

9 (a) Simplify $d + d + d + d$

.....

(1)

(b) Simplify $3 \times e \times f$

.....

(1)

(c) Simplify $2x + 3y + 3x - y$

.....

(2)

(Total for Question 9 is 4 marks)

6 (a) Simplify $m + m + m$

.....

(1)

(b) Simplify $9e - 2e$

.....

(1)

(c) Simplify $5 \times 3g$

.....

(1)

(Total for Question 6 is 3 marks)

7 (a) $L = 3a + 2c$

$a = 5$
$c = 8$

Work out the value of L.

$L =$ .....

(2)

(b) Kirsty buys some buns.
She buys x packs of currant buns and y boxes of iced buns.

There are 6 currant buns in a pack of currant buns.
There are 8 iced buns in a box of iced buns.

Write down an expression, in terms of x and y, for the total number of buns Kirsty buys.

.....

(2)

(Total for Question 7 is 4 marks)

6 Here is a two-stage number machine.

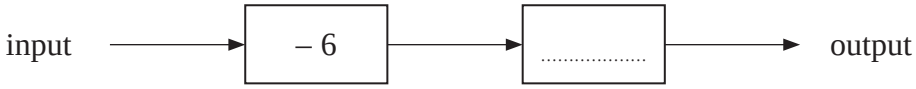


(a) Work out the output when the input is 20

.....

(1)

Here is a different two-stage number machine.



When the input is 10, the output is 12

(b) Complete the number machine.

(1)

(Total for Question 6 is 2 marks)

5 (a) Simplify $e + e + e - e + 3e$

.....

(1)

(b) Simplify $7 \times g \times h$

.....

(1)

(c) Simplify $3a + d - 2a + 5d$

.....

(2)

(Total for Question 5 is 4 marks)

Question 58

17 Buttons are sold in packets and in boxes.

There are 6 buttons in a packet.
There are 15 buttons in a box.

Nomusa buys d packets of buttons and f boxes of buttons.

She buys a total of T buttons.

Write a formula for T in terms of d and f.

.....

(Total for Question 17 is 3 marks)

13 Uzma has a biased coin.

When she throws the coin once, the probability of getting heads is x.

(a) Write down an expression, in terms of x, for the probability of getting tails.

.....

(1)

Uzma throws the coin 200 times.

(b) Write down an expression, in terms of x, for an estimate for the number of times she gets tails.

.....

(2)

(Total for Question 13 is 3 marks)

10 (a) Simplify $t + t + t$

.....

(1)

(b) Simplify $5 \times e \times f$

.....

(1)

(c) Simplify $3x + 8y + x - 2y$

.....

(2)

(Total for Question 10 is 4 marks)

12 You can use this rule to work out the total hire charge, in pounds (£), for hiring a satellite phone.

Total hire charge = number of weeks × 90 + 50

Ismail wants to hire a satellite phone for 4 weeks.

(a) Work out the total hire charge.

£ .....

(2)

Dominik hires a satellite phone.
His total hire charge is £860

(b) For how many weeks did he hire the phone?

..... weeks

(3)

(Total for Question 12 is 5 marks)

4 Here is a two-stage number machine.

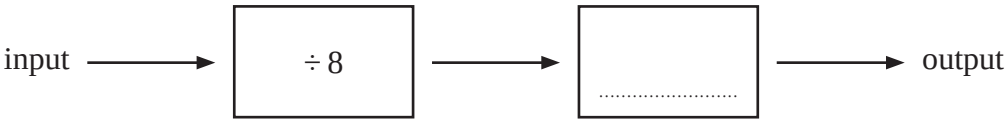


(a) Complete the table.

input	output
1	2
3	14
6	.....
.....	50

(2)

Here is a different two-stage number machine.



When the input is 24, the output is 10

(b) Complete the number machine.

(1)

(Total for Question 4 is 3 marks)

Question 63

15 $p = 2e + 3g$

$e = 6.5$
$g = 2$

Work out the value of p.

.....

(Total for Question 15 is 2 marks)

12 Batteries are sold in packets and in boxes.

There are 4 batteries in a packet.
There are 20 batteries in a box.

Derek buys one box of batteries.
He takes t batteries out of the box.

(a) Write down an expression, in terms of t, for the number of batteries left in the box.

.....

(1)

Sameena buys x packets of batteries and y boxes of batteries.

(b) Write down an expression, in terms of x and y, for the total number of batteries Sameena buys.

.....

(2)

(Total for Question 12 is 3 marks)

13 (a) Simplify $r + r + r + 2r$

.....

(1)

(b) Simplify $7 \times 2t$

.....

(1)

(c) Simplify $6ab - 4ab$

.....

(1)

(Total for Question 13 is 3 marks)

15 (a) Solve $x + x = 20$

$x =$ .....
(1)

(b) Solve $p - 4 = 9$

$p =$ .....
(1)

(c) Solve $3n = 24$

$n =$ .....
(1)

$R = 7x + 4y$
$x = -1$
$y = 3$

(d) Work out the value of R.

$R =$ .....
(2)

(Total for Question 15 is 5 marks)

11 Amber earns £7 for each hour she works from Monday to Friday.
She earns £10 for each hour she works on Saturday.

One week Amber worked for 4 hours on Saturday.
That week she earned a total of £180

(a) How many hours did Amber work that week?

..... hours
(3)

Chris works for 7 hours each day from Monday to Friday.
He earns e pounds for each hour he works.

(b) Write down an expression, in terms of e, for the total amount, in pounds, that Chris earns from Monday to Friday.
Give your answer in its simplest form.

.....
(2)

(Total for Question 11 is 5 marks)

14 (a) Simplify $m + m + m + m + m$

.....

(1)

(b) Simplify $p \times r \times 4$

.....

(1)

(c) Simplify $5x + 4y + 2x - y$

.....

(2)

(Total for Question 14 is 4 marks)

23 The body mass index, B, for a person of mass m kg and height h metres is given by the formula

$$B = \frac{m}{h^2}$$

Usman has a mass of 50 kg.
He has a height of 1.57 m.

(a) Work out Usman's body mass index.
Give your answer correct to one decimal place.

.....

(2)

Tom's height is 1.80 m.
He wants his body mass index to be 21

(b) Work out the mass that will give Tom a body mass index of 21

..... kg

(2)

Tom is a ski jumper.

The maximum length of skis he can use is 145% of his height.
Tom's height is 1.80 m.

(c) Work out the maximum length of skis Tom can use.

..... m

(3)

(Total for Question 23 is 7 marks)

16 Alex is x cm tall.

Bob is 10 cm taller than Alex.
Cath is 4 cm shorter than Alex.

Write an expression, in terms of x, for the mean of their heights in centimetres.

.....

(Total for Question 16 is 3 marks)

16

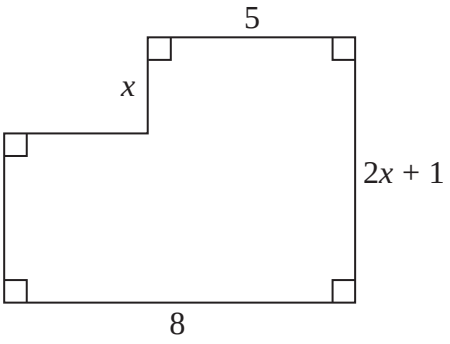


Diagram **NOT** accurately drawn

Here is a shape.
All the measurements are in metres.

The area of the shape is $A\text{m}^2$.

Find a formula for A in terms of x.

.....

(Total for Question 16 is 3 marks)

Question 72

9 $p = 3u + \frac{1}{2}t$

$u = -4$

$t = 18$

Work out the value of p.

.....

(Total for Question 9 is 3 marks)

4 Here is a price list in a school shop.

Price list	
pens	30p each
pencils	20p each
rulers	45p each
erasers	10p each

Beth wants to spend exactly 75p in the shop.

(a) How many different ways are there for Beth to spend exactly 75p?
You must show how you got your answer.

.....

(2)

Alex buys 7 pens and 3 rulers.
He pays with a £5 note.

(b) How much change should Alex get?

£ .....

(3)

Chris buys y pencils.

(c) Write down an expression, in terms of y, for the total cost of the pencils in pence.

..... pence

(1)

(Total for Question 4 is 6 marks)

11 (a) Simplify $h + h + h$

.....
(1)

(b) Simplify $p \times r \times 3$

.....
(1)

(c) Simplify $5x + 4y - 3x + 3y$

.....
(2)

$k = 5$
$m = 3$

(d) Work out the value of $2k + 4m$

.....
(2)

(Total for Question 11 is 6 marks)

10 There are 20 red counters and 15 blue counters in a bag.

(a) Write down the ratio of the number of red counters to the number of blue counters. Give your ratio in its simplest form.

.....

(2)

There are only red counters and blue counters in the bag.
x red counters are taken from the bag.
y blue counters are taken from the bag.

(b) Write down an expression, in terms of x and y, for the total number of counters now in the bag.

.....

(2)

(Total for Question 10 is 4 marks)

4 (a) Solve $7x = 42$

$x =$ .....
(1)

(b) Solve $p + 7 = 11$

$p =$ .....
(1)

(c) Solve $17 - g = 11$

$g =$ .....
(1)

(d) Solve $8q - 3 = 23$

$q =$ .....
(2)

(e) $v = u + 5t$
$u = 4$
$t = 3$

Work out the value of v.

$v =$ .....
(2)

(Total for Question 4 is 7 marks)

13 $y = 4x - 3t$

$x = 2$
$t = 5$

(a) Work out the value of y.

$y =$ .....
(2)

$y = 4x - 3t$

$y = 30$
$t = 2$

(b) Work out the value of x.

$x =$ .....
(2)

(Total for Question 13 is 4 marks)

16 (a) Simplify $4x + 3x$

.....

(1)

(b) Simplify $2 \times 3y$

.....

(1)

(c) Simplify $5e + 4e^2 + 3e - 6e^2$

.....

(2)

(Total for Question 16 is 4 marks)

Question 79

3 (a) Simplify $7 \times e \times f \times 8$

.....

(1)

(b) Solve $\frac{x}{5} = 2\frac{1}{2}$

$x =$ .....

(1)

(Total for Question 3 is 2 marks)

Question 80

16 $v = u + at$

$u = 1 \qquad a = -3 \qquad t = \frac{1}{2}$

Work out the value of v.

$v =$ .....

(Total for Question 16 is 2 marks)

Question 81

June 2017 | 1MA1/2F | Original Q1

1 (a) Simplify $5p - 3p + p$

.....

(1)

(b) Simplify $m^3 + m^3$

.....

(1)

(c) Simplify $10 + 3c + 5d - 7c + d$

.....

(2)

(Total for Question 1 is 4 marks)

Question 82

2 Cups are sold in packs and in boxes.

There are 12 cups in each pack.
There are 18 cups in each box.

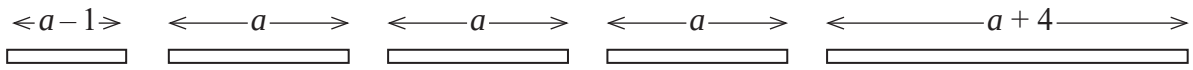
Alison buys p packs of cups and b boxes of cups.

Write down an expression, in terms of p and b, for the total number of cups Alison buys.

.....

(Total for Question 2 is 2 marks)

6 Here are five straight rods.



All measurements are in centimetres.

The total length of the five rods is L cm.

Find a formula for L in terms of a.
Write your formula as simply as possible.

.....

(Total for Question 6 is 3 marks)

3 (a) Simplify $3f \times 5g$

.....

(1)

(b) Simplify $t \times t$

.....

(1)

(c) Simplify $\dfrac{2n + 6n}{2}$

.....

(1)

(Total for Question 3 is 3 marks)

Question 85

November 2017 | 1MA1/3F | Original Q2

2 Simplify $y + 3y - 2y$

.....

(Total for Question 2 is 1 mark)

Question 86

June 2018 | 1MA1/1F | Original Q6

6 (a) Simplify $3 \times 4t$

.....

(1)

(b) Simplify $8a - 3a + 2a$

.....

(1)

(Total for Question 6 is 2 marks)

Question 87

June 2018 | 1MA1/2F | Original Q20

20 (a) Simplify $m^3 \times m^4$

.....

(1)

(b) Simplify $(5np^3)^3$

.....

(2)

(c) Simplify $\dfrac{32q^9r^4}{4q^3r}$

.....

(2)

(Total for Question 20 is 5 marks)

Question 88

November 2018 | 1MA1/2F | Original Q7

7 (a) Simplify $3m - m - m + 3m$

.....

(1)

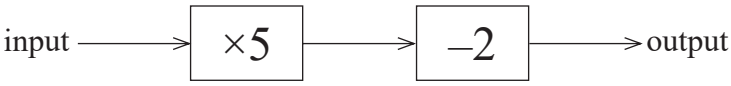
(b) Simplify $2 \times n \times p \times 4$

.....

(1)

(Total for Question 7 is 2 marks)

10 Here is a number machine.



(a) Work out the **output** when the input is 8

.....

(1)

(b) Work out the **input** when the output is 28

.....

(2)

(Total for Question 10 is 3 marks)

Question 90

25 A is the point with coordinates (5, 9)
B is the point with coordinates (d, 15)

The gradient of the line AB is 3

Work out the value of d.

.....

(Total for Question 25 is 3 marks)

Question 91

13 The length of a line is x centimetres.

Write down an expression, in terms of x, for the length of the line in millimetres.

.....

(Total for Question 13 is 1 mark)

Question 92

7 There are y boats on a lake.
There are 7 people in each boat.

Write an expression, in terms of y, for the total number of people in the boats.

.....

(Total for Question 7 is 1 mark)

Question 93

June 2019 | 1MA1/2F | Original Q8

8 (a) Simplify $a \times b \times 7$

.....

(1)

(b) Simplify $y \times y \times y$

.....

(1)

(c) Simplify fully $\dfrac{e \times e \times e \times f}{e \times e \times f \times f}$

.....

(2)

(Total for Question 8 is 4 marks)

Question 94

11 $P = 7r + 3q$

Work out the value of P when $r = 5$ and $q = -4$

.....

(Total for Question 11 is 2 marks)

Question 95

25 Sally used her calculator to work out the value of a number y.

The answer on her calculator display began

8.3

Complete the error interval for y.

..... $\leqslant y <$ .....

(Total for Question 25 is 2 marks)

Question 96

9 Simplify $4e + 6f + 7e - f$

.....

(Total for Question 9 is 2 marks)

15 You can use this rule to work out the total hire charge, in pounds (£), for hiring a 3D printer for a number of weeks.

Total hire charge (£) = number of weeks × 70 + 50

Mia wants to hire a 3D printer for 4 weeks.

(a) Work out the total hire charge.

£.....

(2)

Zahir hires a 3D printer.
The total hire charge is £680

(b) For how many weeks does Zahir hire the 3D printer?

..... weeks

(2)

(Total for Question 15 is 4 marks)

Question 98

13 (a) Simplify $2a \times 5b$

.....

(1)

(b) Simplify $3x + 2y + 5x - y$

.....

(2)

(Total for Question 13 is 3 marks)

Question 99

21 There are 60 people in a choir.
Half of the people in the choir are women.

The number of women in the choir is 3 times the number of men in the choir.
The rest of the people in the choir are children.

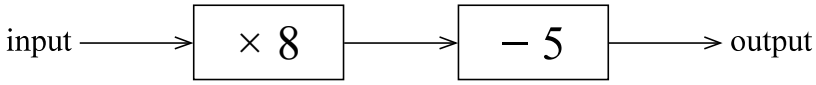
the number of children in the choir : the number of men in the choir = n : 1

Work out the value of n.
You must show how you get your answer.

n = ...

(Total for Question 21 is 4 marks)

8 Here is a number machine.

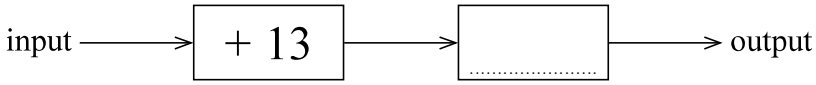


(a) Work out the output when the input is 6

.....

(1)

Here is a different number machine.



When the input is 17, the output is 10

(b) Complete the number machine.

(1)

(Total for Question 8 is 2 marks)

18 Ben is n years old.
Chloe is twice as old as Ben.
Dan is five years younger than Ben.

The total of Ben's age, Chloe's age and Dan's age is T years.

(a) Find a formula for T in terms of n.

.....

(3)

(b) In the table below, put a tick (✓) in the box next to the identity.

$3h + 2 = 14$	
$3a + 4b - 2c$	
$A = \pi r^2$	
$5m - 3m = 2m$	
$x + 7 \leqslant 12$	

(1)

(Total for Question 18 is 4 marks)

20 An estimate of the height, H metres, of a tall building can be found using the formula

$$H = 4f + 12$$

where the building is f floors high.

A tall building is 110 floors high.
The real height of the building is 442 m.

Seb uses the formula to find an estimate of the height of this building.
He then finds the difference between his estimate and the real height.

Show that this difference is less than 5% of the real height.

(Total for Question 20 is 4 marks)

28 The number of days, d, that it will take to build a house is given by

$$d = \frac{720}{n}$$

where n is the number of workers used each day.

Ali's company will take 40 days to build the house.
Hayley's company will take 30 days to build the house.

Hayley's company will have to use more workers each day than Ali's company.

How many more?

.....

(Total for Question 28 is 3 marks)

12 The diagram shows a number machine.



(a) Find the output when the input is 7

.....

(1)

(b) Find the input when the output is 41

.....

(2)

(Total for Question 12 is 3 marks)

30 (a) Make q the subject of $p = 6q + 7$

.....

(2)

(b) Simplify $(m^{-2})^{-3}$

.....

(1)

(Total for Question 30 is 3 marks)

3 Simplify $3e - e + 4e$

.....

(Total for Question 3 is 1 mark)

15 $T = 3x + 4y$

(a) Work out the value of T when $x = 5$ and $y = -7$

.....

(2)

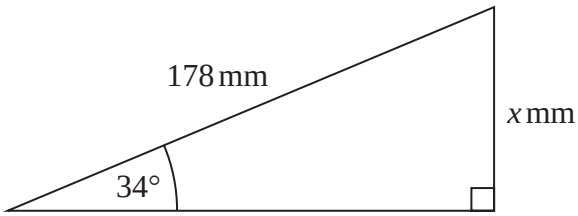
(b) Work out the value of y when $T = 38$ and $x = 6$

.....

(2)

(Total for Question 15 is 4 marks)

25



Work out the value of x.
Give your answer correct to 1 decimal place.

.....

(Total for Question 25 is 2 marks)

14 (a) Simplify $3x + 5y + 2x - 4y$

.....

(2)

(b) Solve $5p + 7 = 22$

p = ...

(2)

(Total for Question 14 is 4 marks)

23 (a) Simplify $n^3 \times n^5$

.....

(1)

(b) Simplify $\frac{c^3d^4}{c^2d}$

.....

(2)

(c) Solve $\frac{5x}{2} > 7$

.....

(2)

(Total for Question 23 is 5 marks)

4 (a) Simplify $m + m + m + m$

.....

(1)

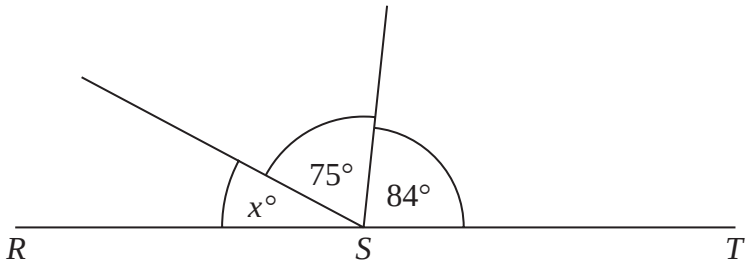
(b) Simplify $12p \div 4$

.....

(1)

(Total for Question 4 is 2 marks)

13



RST is a straight line.

(i) Work out the value of *x*.

.....

(2)

(ii) Give a reason for your answer.

.....

.....

.....

(1)

(Total for Question 13 is 3 marks)

20 (a) Simplify $c^5 \div c^2$

.....

(1)

(b) Simplify $(d^4)^3$

.....

(1)

(Total for Question 20 is 2 marks)

6 (a) Simplify $a \times b \times 4$

.....

(1)

(b) Simplify $4x + 3 - x + 5$

.....

(2)

(Total for Question 6 is 3 marks)

11 (a) Write 196 minutes in hours and minutes.

..... hours ..... minutes

(2)

A train travels x miles in 2 hours.

(b) Write down an expression, in terms of x, for the average speed of the train.

..... miles per hour

(1)

(Total for Question 11 is 3 marks)

Question 116

2 Simplify $e + e + e + e$

.....

(Total for Question 2 is 1 mark)

Question 117

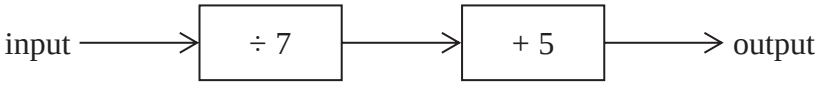
14 $y = 6x - 5$

Work out the value of y when $x = 4$

$y =$ .....

(Total for Question 14 is 2 marks)

12 Here is a number machine.

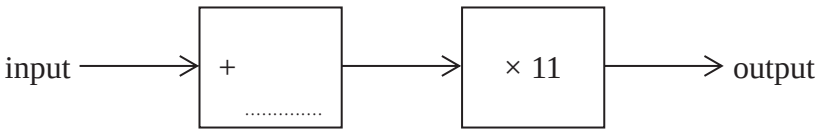


(a) Work out the output when the input is 28

.....

(1)

Here is a different number machine.
The number machine is not complete.



When the input is 8, the output is 154

(b) Complete the number machine.

(2)

(Total for Question 12 is 3 marks)

4 Simplify $2m \times 3$

.....

(Total for Question 4 is 1 mark)

24 Rick, Selma and Tony are playing a game with counters.

Rick has some counters.
Selma has twice as many counters as Rick.
Tony has 6 counters less than Selma.

In total they have 54 counters.

the number of counters Rick has : the number of counters Tony has = 1 : p

Work out the value of p.

p = ...

(Total for Question 24 is 5 marks)

Question 121

5 Simplify $3 \times w \times 5 \times t$

.....

(Total for Question 5 is 1 mark)

Question 122

21 Simplify $(2^{-5} \times 2^{8})^{2}$

Give your answer as a power of 2

.....

(Total for Question 21 is 2 marks)

14 (a) Simplify $4c + 7d + 3c - d$

.....

(2)

(b) Solve $5(2m - 6) = 40$

$m =$ .....

(3)

There are x sweets in a box.

There are y sweets in a packet.

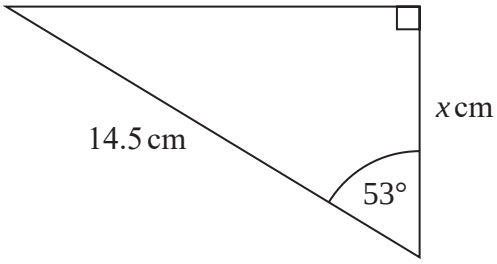
(c) Write an expression, in terms of x and y, for the total number of sweets in 3 boxes and 2 packets.

.....

(2)

(Total for Question 14 is 7 marks)

22



Work out the value of x.
Give your answer correct to 3 significant figures.

x = ...

(Total for Question 22 is 2 marks)

18 Naomi has b bags of apples and c crates of apples.

There are 5 apples in each bag.
There are 28 apples in each crate.

Naomi has a total of T apples.

Write a formula for T in terms of b and c.

.....

(Total for Question 18 is 3 marks)

Question 126

4 Simplify $3 \times 4t$

.....

(Total for Question 4 is 1 mark)

3 Simplify $m + m + m + m$

.....

(Total for Question 3 is 1 mark)

19 Jenny invests £3000 for 6 years at y% simple interest per year.

At the end of the 6 years, Jenny has received a total of £450 in interest.

Work out the value of y.

$y =$ .....

(Total for Question 19 is 3 marks)

3 Simplify $3 \times a \times 4$

.....

(Total for Question 3 is 1 mark)

12 $P = 2g + 4h$

(a) (i) Work out the value of P when $g = 3$ and $h = 5$

$P =$ .....

(2)

(ii) Work out the value of g when $P = 38$ and $h = 3$

$g =$ .....

(2)

$V = 3r - q$

(b) Work out the value of V when $r = -3$ and $q = 2$

$V =$ .....

(2)

(Total for Question 12 is 6 marks)

Question 131

13 (a) Simplify $8h^3 + 14h^3 - 2h^3$

.....

(1)

(b) Simplify $(9y + 12y) \div 3$

.....

(1)

(Total for Question 13 is 2 marks)

9 Here is a number machine.



(a) Work out the output when the input is 13

.....

(1)

(b) Work out the input when the output is 28

.....

(2)

(c) Show that there is a number for which the output is the same as the input.

(2)

(Total for Question 9 is 5 marks)

Question 133

5 Complete the statement below to make it correct.

..... $\times m = 2m$

(Total for Question 5 is 1 mark)

13 (a) Simplify $2c \times 3d$

.....

(1)

$T = x + 2y$

$x = 3$ and $y = -4$

(b) Work out the value of T.

$T =$ .....

(2)

(Total for Question 13 is 3 marks)

4 Simplify $7a + a - 5a$

.....

(Total for Question 4 is 1 mark)

16 (a) Simplify $m \times m \times m \times m$

.....

(1)

In a competition, a player gets

5 points for each game they win
2 points for each game they draw
0 points for each game they lose.

Amy wins x games and draws y games.

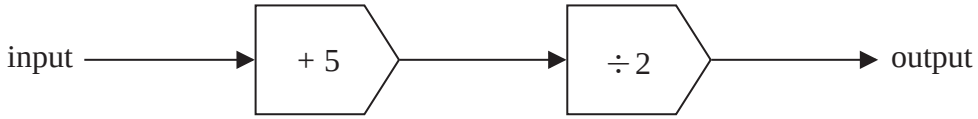
(b) Write down an expression, in terms of x and y, for the total number of points Amy gets.

.....

(2)

(Total for Question 16 is 3 marks)

13 Here is a number machine.

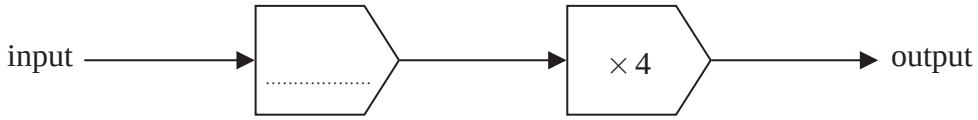


(a) Find the output when the input is 11

.....

(2)

Here is a different number machine.



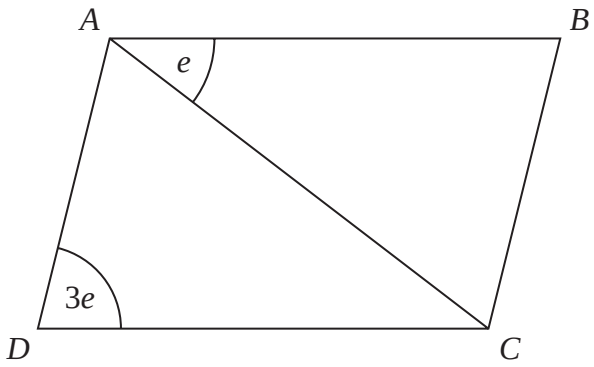
When the input is 10, the output is 28

(b) Complete this number machine.

(2)

(Total for Question 13 is 4 marks)

21 *ABCD* is a parallelogram.



All angles are measured in degrees.

Find an expression, in terms of *e*, for the size of angle *CAD*.
Give a reason for each stage of your working.

.....

(Total for Question 21 is 3 marks)

11 (a) Simplify $2x \times 3y$

.....

(1)

(b) Simplify $3d - 4e + 2d + e$

.....

(2)

(Total for Question 11 is 3 marks)

27 $1.25 \times 10^{-12} = k \times (4 \times 10^{-20})$

Work out the value of k.
Give your answer in standard form.

$k =$ .....

(Total for Question 27 is 2 marks)

12 A shop sells apples and oranges.

There are 6 apples in each pack of apples.
There are 7 oranges in each bag of oranges.

The shop sells x packs of apples and y bags of oranges.

Write an expression, in terms of x and y, for the total number of apples and oranges the shop sells.

.....

(Total for Question 12 is 2 marks)

25 (a) Simplify fully $2x^3y^5 \times 7x^2y$

.....

(2)

(b) Simplify $(m^2)^{-3}$

.....

(1)

(Total for Question 25 is 3 marks)

Question 143

1 Simplify $e + e + e + e + e$

.....

(Total for Question 1 is 1 mark)

9 Greg is x years old.

Greg is 5 years older than Katy.

(a) Write down an expression, in terms of x, for Katy's age.

.....

(1)

Carl is twice as old as Greg.

(b) Write down an expression, in terms of x, for Carl's age.

.....

(1)

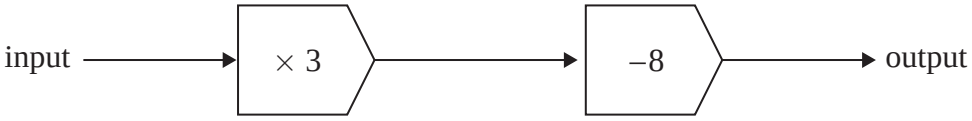
(c) Solve $4y = 12$

$y =$ .....

(1)

(Total for Question 9 is 3 marks)

13 Here is a number machine.



(a) Find the output when the input is 6

.....

(1)

(b) Find the input when the output is −11

.....

(2)

(Total for Question 13 is 3 marks)

22 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.

n = ...

(5)

10 milk chocolates from the box are eaten.

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

.....

.....

.....

(1)

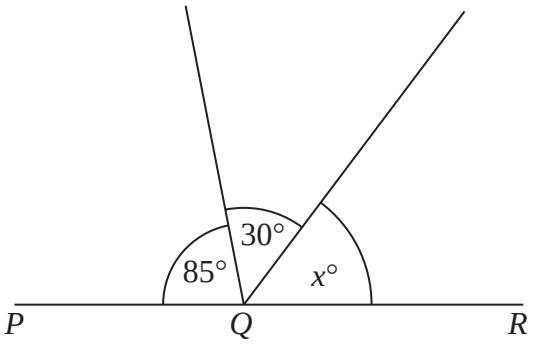
(Total for Question 22 is 6 marks)

2 Simplify $2 \times 3n$

.....

(Total for Question 2 is 1 mark)

9



PQR is a straight line.

(i) Work out the value of *x*.

$x =$ .....

(2)

(ii) Give a reason for your answer.

.....

.....

.....

(1)

(Total for Question 9 is 3 marks)

13 (a) Simplify $n \times n \times n$

.....

(1)

(b) Solve $5k - 4 = 26$

$k =$ .....

(2)

(Total for Question 13 is 3 marks)

25 Here are two lists of numbers.

List **A**	276	400	157	139		
List **B**	530	500	270	x	440	320

mean of list **A** : mean of list **B** = 3 : 5

Work out the value of x.

x = ...

(Total for Question 25 is 5 marks)