1. Here is a table for a two-stage number machine.
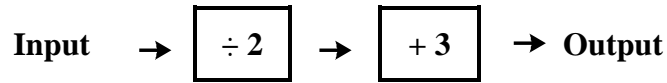It divides by 2 then adds 3.
Complete the missing numbers in the table:

Input → | ÷ 2 | → | + 3 | → Output

Input	Output
2	4
4	5
6	………..
12	………..
………….	13

(4)
(Total 4 marks)

2. Bob uses gas to heat his house.
This rule gives the cost of gas.

| Cost of gas | = | Number of units of gas | × | Cost of one unit |

The cost of one unit of gas is 24 pence.
Last year Bob used 564 units of gas to heat his house.

(a) Work out the cost of 564 units of gas.

£……………………

(2)

Sarah uses electricity to heat her house.
This rule gives the cost of electricity.

| Cost of electricity | = | Number of units of electricity | × | Cost of one unit | + | Fixed charge |

IV

The cost of one unit of electricity is 6 pence.
The fixed charge is £7.24
Last year Sarah used 2130 units of electricity to heat her house.

Sarah says that last year she paid less to heat her house than Bob paid to heat his house.
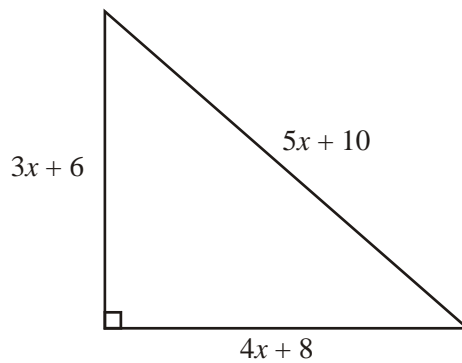
(b)   Is Sarah correct?
       You must show how you reached your decision.

(3)
(Total 5 marks)

3.   (a)   Factorise $3x + 6$

....
(1)

Here is a right-angled triangle.

The lengths of the three sides of the triangle are $3x + 6$, $4x + 8$ and $5x + 10$.
All measurements are in centimetres.

(b)   Find an expression, in terms of x, for the perimeter of the triangle.
       Give your answer in its simplest form.

....
(2)

The perimeter of the triangle is 42 cm.

(c) (i) Find the value of x.

$x =$ ……………………….
(1)

(ii) Find the length of the shortest side of the triangle.

…………………………… cm
(4)
(Total 7 marks)

4. A school has a photocopier and a printing machine.
The cost of using the photocopier is given by the rule

| Cost of using the photocopier | = | number of copies | × | cost of one copy |

The cost of one copy is 4 pence.

Geoff makes 96 copies.

(a) Work out the cost of using the photocopier to make 96 copies.

£ ……………………….
(2)

The cost of using the printing machine is given by the following rule

Cost of using the printing machine				
	=	number of copies	× cost of one copy	+ copy fee

The cost of one copy is 3 pence.
The copy fee is 40 pence.

Charlotte makes 96 copies using the printing machine.

(b)   Work out the difference in their costs between Geoff and Charlotte.

£ ……………………….

(2)

(Total 4 marks)

5.   Barry and Kath are studying a number pattern.

The first three numbers in the number pattern are   1, 2, 4

Barry says that the next number is 8.

Kath says the next number is 7.

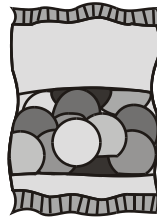Explain why both Barry and Kath could be right.

....

....

....

(Total 2 marks)
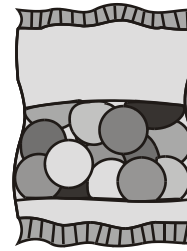
6. Audrey sells packets of sweets.
There are three sizes of packets.

Small   Medium   Large

There are n sweets in the small packet.

There are twice as many sweets in the medium packet as there are in the small packet.

(a)   Write down an expression, in terms of n, for the number of sweets in the medium packet.

....

(1)

There are 15 more sweets in the large packet than in the medium packet.

(b)   Write down an expression, in terms of n, for the number of sweets in the large packet.

....

(1)

A small packet of sweets costs 20p.

Sebastian buys q small packets of sweets.

(c)   Write down an expression, in terms of q, for the cost in pence of the sweets.

.... pence

(1)
(Total 3 marks)

7.
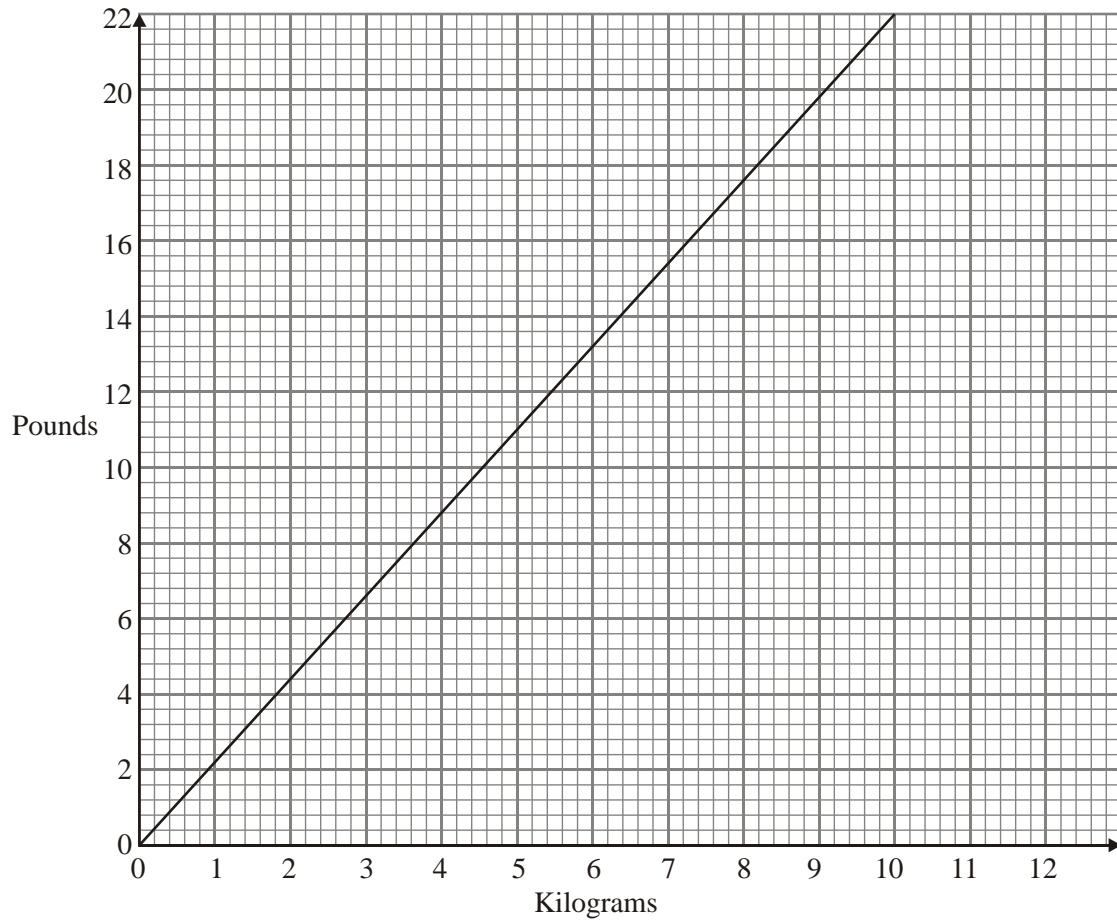
The conversion graph above can be used for changing between kilograms and pounds.

(a)   Use the graph to change 22 pounds to kilograms.

.... kg

(1)

(b)   Use the graph to change 2.5 kilograms to pounds.

.... pounds

(1)

Firoza weighs 110 pounds.

(c)   Change 110 pounds to kilograms.

.... kg

(3)

IV

8. The table shows some rows of a number pattern.

Row 1	1		$=$	$\dfrac{1 \times 2}{2}$
Row 2	1 + 2		$=$	$\dfrac{2 \times 3}{2}$
Row 3	1 + 2 + 3		$=$	$\dfrac{3 \times 4}{2}$
Row 4	1 + 2 + 3 + 4			
Row 8				

(a) In the table, complete row 4 of the number pattern.

(1)
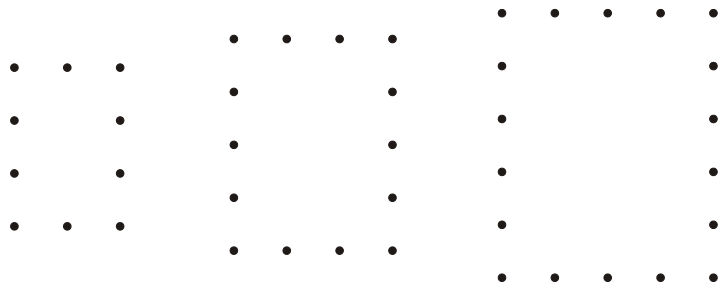
(b) In the table, complete row 8 of the number pattern.

(1)

(c) Work out the sum of the first 100 whole numbers.

....

(1)

(Total 3 marks)

9. Here are some patterns made up of dots.

Pattern number 1   Pattern number 2   Pattern number 3

(a) In the space below, draw Pattern number 4.

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of dots	10	14	18		

(1)

(c) How many dots are used in Pattern number 10?

....

(1)
(Total 3 marks)

10. Martin cleaned his swimming pool.
He hired a cleaning machine to do this job.
The cost of hiring the cleaning machine was

£35.50 for the first day,
then £18.25 for each extra day.

Martin's total cost of hiring the machine was £163.25

(a) For how many days did Martin hire the machine?

.... days

(3)

Martin had to buy some cleaning materials.

The cost of the cleaning materials was £64.00 plus VAT at $17\frac{1}{2}$%.

(b) Work out the total cost of the cleaning materials.

£ ....

(2)

(Total 5 marks)

11. (a) Solve $3x = 18$

$x =$....................

(1)

(b) Expand $t(t-2)$

....

(1)

(c)   Factorise $3y – 12$

....
(1)
(Total 3 marks)

12. (a)   The first odd number is 1.

(i)   Find the 3rd odd number.

…………………….

(ii)   Find the 12th odd number.

…………………….
(2)

(b)   Write down a method you could use to find the 100th odd number.

……………………………………………………………………………………………

……………………………………………………………………………………………
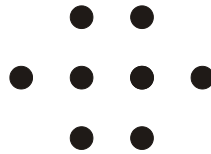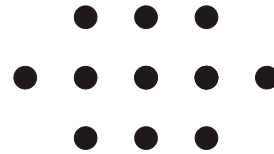**(1)**

Here are some patterns made with dots.
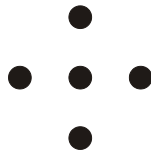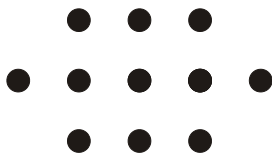
Pattern Number 1   Pattern Number 2   Pattern Number 3

(c)   In the space below, complete Pattern Number 4.

(1)

The table shows the number of dots used to make each pattern.

(d)   Complete the table

Pattern Number	1	2	3	4	5
Number of dots	5	8	11		

(2)
(Total 6 marks)

IV

13. Alison travels by car to her meetings.

Alison's company pays her 32p for each mile she travels.

One day Alison writes down the distance readings from her car.

Start of the day: 2430 miles
End of the day: 2658 miles

(a)   Work out how much the company pays Alison for her day's travel.

£……………………

(4)

The next day Alison travelled a total of 145 miles.

She travelled $\dfrac{2}{5}$ of this distance in the morning.

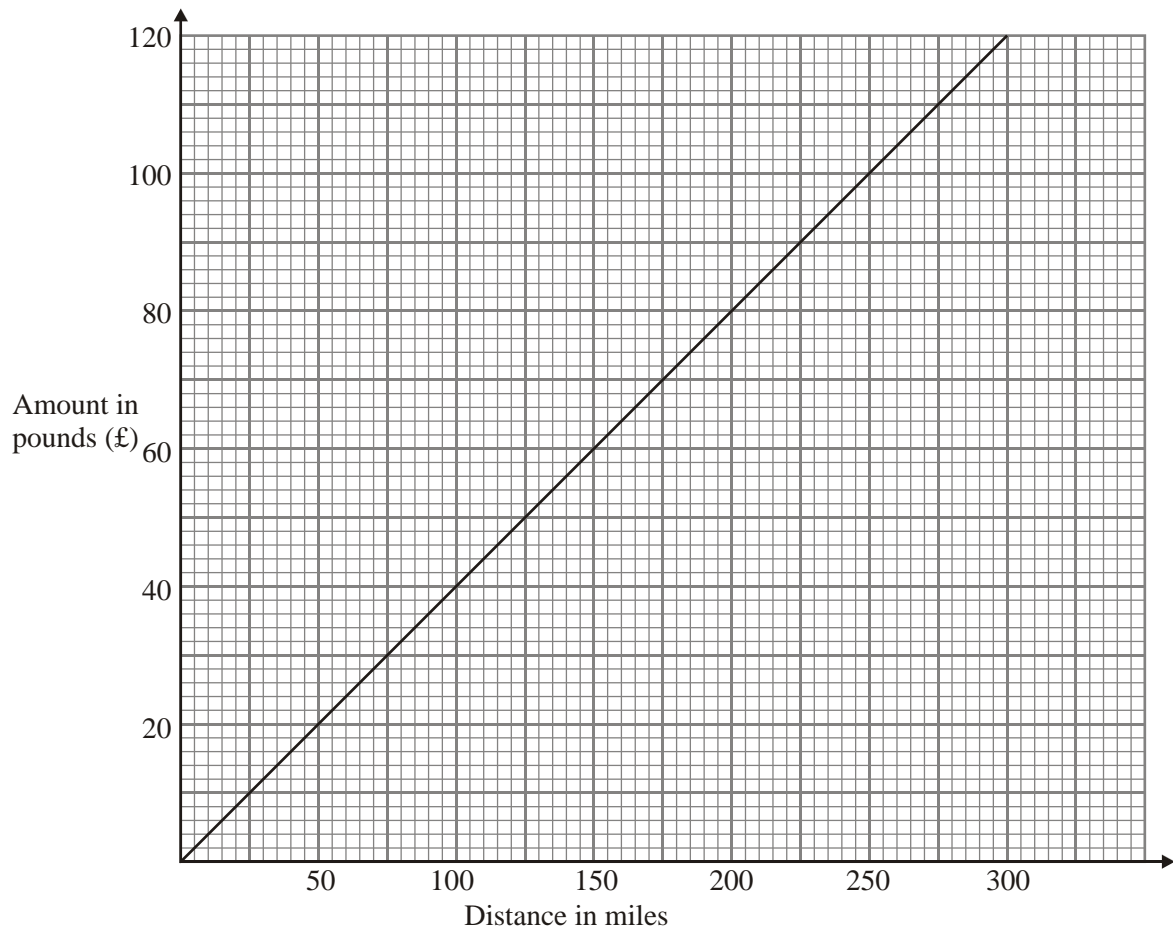(b)   How many miles did she travel during the rest of the day?

………………miles

(3)

Tom also travels by car to his meetings.

Tom's company works out the amount it will pay him for the distance he travels.

It uses the graph below.

(c)   Use the graph to write down

(i)   the amount Tom's company pays him when he travels 200 miles,

£……………………

(ii)   the distance Tom travels when his company pays him £50.

………………miles

(2)
(Total 9 marks)

IV

14. Andrew, Brenda and Callum each collect football stickers.

Andrew has *x* stickers.

Brenda has three times as many stickers as Andrew.

(a) Write down an expression for the number of stickers that Brenda has.

………………………

(1)

Callum has 9 stickers less than Andrew.

(b) Write down an expression for the number of stickers that Callum has.

………………………

(1)

(Total 2 marks)

15. John tries to hit some tins at a fair.
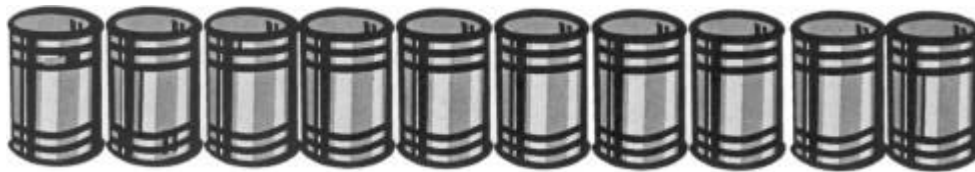
He is given five balls to do this.

The number of points he scores is given by the formula

Number of points = 5 × number of hits – 3 × number of misses

John had 3 hits and 2 misses.

Work out John's total score.

……………….. points

(Total 2 marks)

16. $y = 4x - 5$

(a) Find the value of x when $y = 1$

$x =$ …………………….
(2)

(b) Simplify $pq + pq + pq$

………………………...
(1)
(Total 3 marks)

17. (a) Factorise $3x + 6$

……………………
(1)

Here is a right-angled triangle.
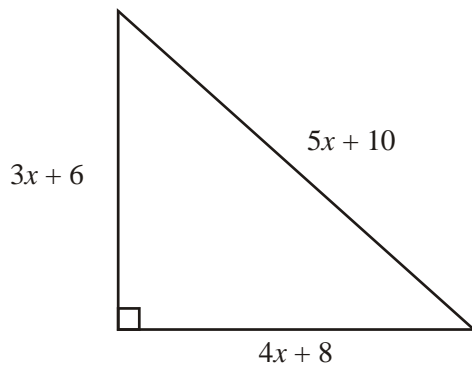
The lengths of the three sides of the triangle are $3x + 6$, $4x + 8$ and $5x + 10$.
All measurements are in centimetres.

(b) Find an expression, in terms of x, for the perimeter of the triangle.
Give your answer in its simplest form.

……………………………….
(2)
(Total 3 marks)

IV

18. Adam makes some patterns using sticks.

Pattern Number 1   Pattern Number 2   Pattern Number 3

5 sticks   9 sticks   13 sticks

(a)   Draw Pattern Number 4 in the space above.

(1)

(b)   Complete the table.

Pattern Number	1	2	3	4	5
Number of sticks	5	9	13		

(1)
(Total 2 marks)

19.   You can use this rule to work out the number of minutes it takes to cook a turkey.

> Multiply the turkey's weight, in kg, by 40.
> Then add 30.

A turkey's weight is 4.5 kg.
Use the rule to work out the number of minutes it will take to cook this turkey.

………………………………
(Total 2 marks)

IV

20. You can use this rule to work out the cost of a taxi journey.

cost of taxi journey = cost per kilometre $\times$ number of kilometres

The cost per kilometre of a taxi journey is 35p.

Use the rule to work out the cost of a taxi journey of 9 km.
Give your answer in pounds (£).

£ ……………………………
(Total 2 marks)

21. Here are the first four numbers of a simple sequence.

5   8   11   14

(a)   Write down the next two numbers of the sequence.

…………… ……………
(2)

(b)   Write down, in words, the rule to continue this sequence.

…………………………………………………………………………………………………
(1)
(Total 3 marks)

22.
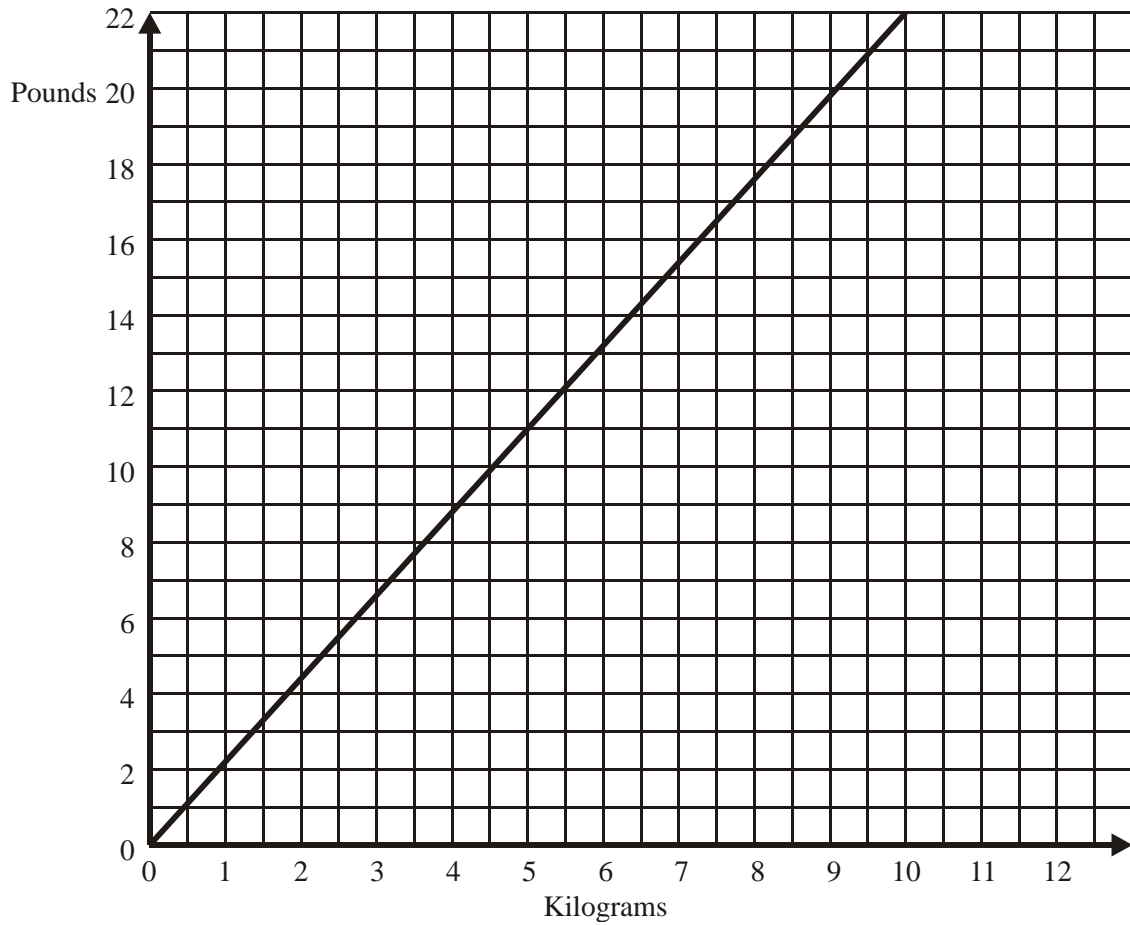
The conversion graph above can be used for changing between kilograms and pounds.

(a)   Use the graph to change 22 pounds to kilograms.

.... kg

(1)

(b)   Use the graph to change 2.5 kilograms to pounds.

.... pounds

(1)

(Total 2 marks)

IV

23. $P = x^2 - 5x$

Find the value of P when $x = -4$

$P =$ ....
(Total 2 marks)

24. Factorise $\qquad\qquad 3y + y^2$

....
(Total 2 marks)

25. A group of adults and children go to a concert.

COST OF TICKETS

Adult   £5.60
Child   £2.30

The **total** cost of tickets for the group was £75.00
Each adult bought 1 adult ticket and 3 child tickets.
Work out the number of **adults** in the group.

....
(Total 3 marks)

IV

26. Simplify $5x + 3y - y + 2x$

……………………………………..

(Total 2 marks)

27. (a) Simplify $q + q + q + q$

…………………….

(1)

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

…………………….

(2)

(Total 3 marks)

IV

28.

Tanya picks strawberries to earn some money.
She puts the strawberries in baskets.

The formula can be used to work out her pay.

> Pay = £15 per day + £2 for each full basket

Tanya worked all day on Monday.
She filled 12 baskets with strawberries.

Work out Tanya's pay on Monday.

£ …………….

(Total 2 marks)

29. Here are the first four terms of a simple sequence.
Write down the next term in the sequence.

$$5 \quad 12 \quad 19 \quad 26$$

…………………
(Total 1 mark)

30. (a) Solve $w - 3 = 9$

$w =$ …………..
(1)

(b) Solve $8x = 56$

$x =$ …………..
(1)

IV

(c)   Solve $5y + 3 = 3y + 10$

$y =$ …………..

(3)

(Total 5 marks)

31.   Eggs are sold in boxes.
A small box holds 6 eggs.

Hina buys x small boxes of eggs.

Write down, in terms of x, the total number of eggs in these small boxes.

....

(Total 1 mark)

32.   (a)   Solve $3x = 18$

$x =$ ....

(1)

(b)   Expand $t(t - 2)$

....

(1)

IV

(c)   Factorise $3y - 12$

....

(1)

(d)   Solve $4w + 5 = w - 7$

$w = $ ....

(3)

(Total 6 marks)

33.   Here are the first 4 terms of a simple number sequence.

                  6   11   16   21

(i)   Write down the next term of the sequence.

....

(ii)   Explain how you found your answer.

....

(Total 2 marks)

34.   You can use this formula to work out the cost of printing a number of leaflets.

printing cost = price per leaflet × number of leaflets + fixed charge

The price per leaflet is £0.32
The number of leaflets is 1400
The fixed charge is £65.50

Work out the printing cost.

£ ....

(Total 3 marks)

IV

35. (a) Simplify

$$x + x + x$$

....
(1)

(b) Simplify

$$2e \times 3f$$

....
(1)
(Total 2 marks)

36. Simplify

$$6x + 3y - x + 5y$$

....
(Total 2 marks)

37. (a) Solve $5x = 30$

$x =$ ....
(1)

(b) Solve $2y - 4 = 11$

$y =$ ....
(2)
(Total 3 marks)

38. (a) Simplify $d + d + d$

…………….
(1)

IV

(b)   Simplify $2c + 4c + c$

    ……………
    (1)

(c)   Solve $x + 7 = -3$

    $x = $ ………..
    (1)

(d)   Solve $5y + 3 = 15$

    $y = $ ………..
    (2)
    (Total 5 marks)

39.   Alison travels by car to her meetings.
    Alison's company pays her 32p for each mile she travels.

    One day Alison writes down the distance readings from her car.
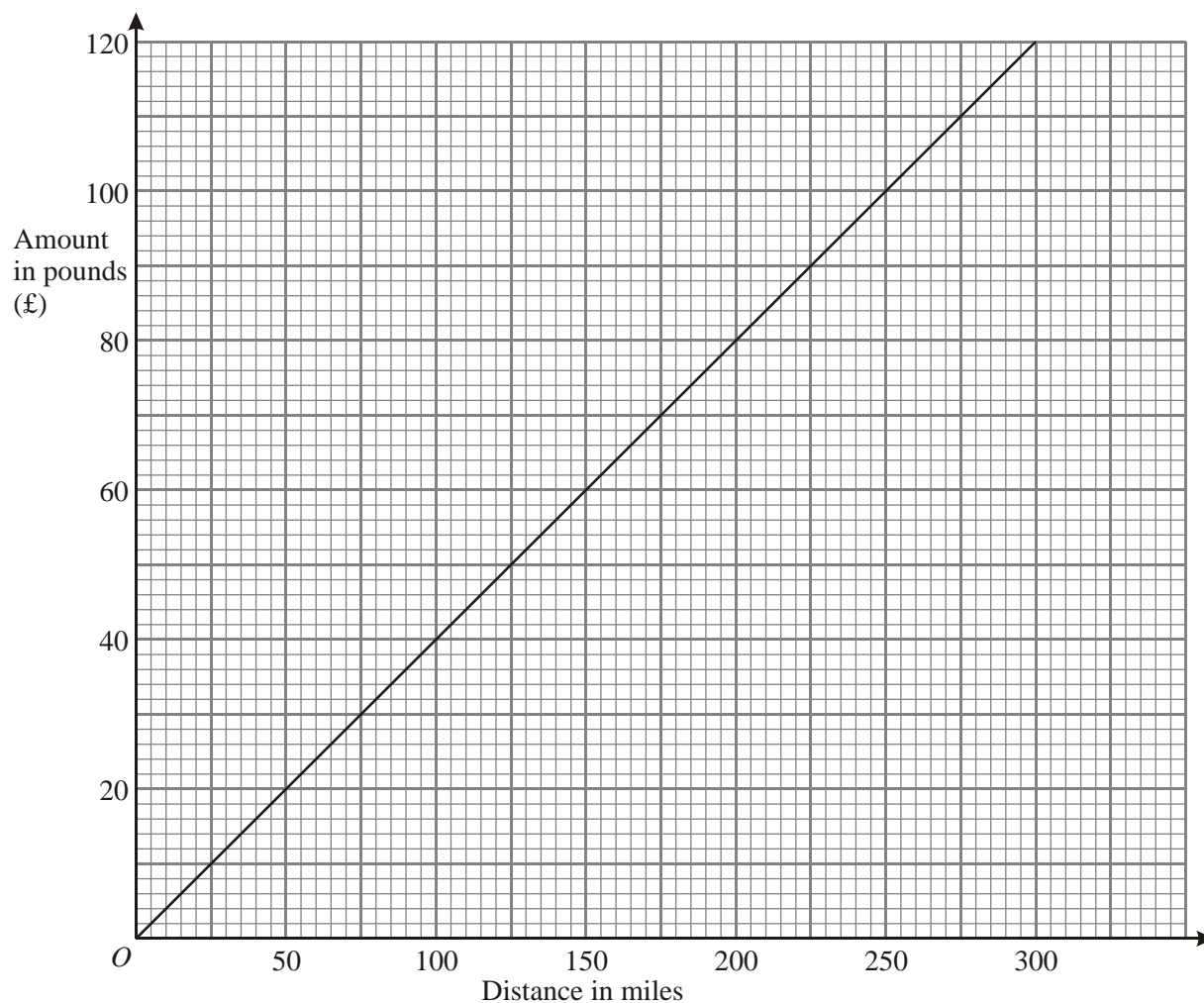
    Start of the day: 2430 miles
    End of the day: 2658 miles

    (a)   Work out how much the company pays Alison for her day's travel.

    £ …………………
    (4)

IV

Tom also travels by car to his meetings.
Tom's company works out the amount it will pay him for the distance he travels.
It uses the graph below.

(b)   Use the graph to write down

   (i)   the amount Tom's company pays him when he travels 200 miles,

£ ………………..

   (ii)   the distance Tom travels when his company pays him £50.

……………….. miles

(2)
(Total 6 marks)