Equations

Name _____ Date_____

These pages explore the use of equations in real life scenarios.

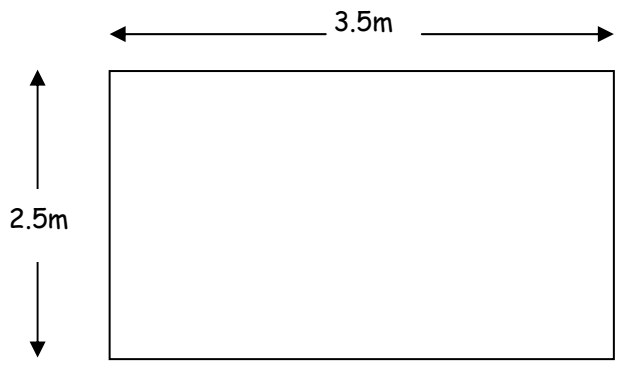
Substitute the values given in each problem into the equation and then work out the answer.

Question 1

W = width. L = length.

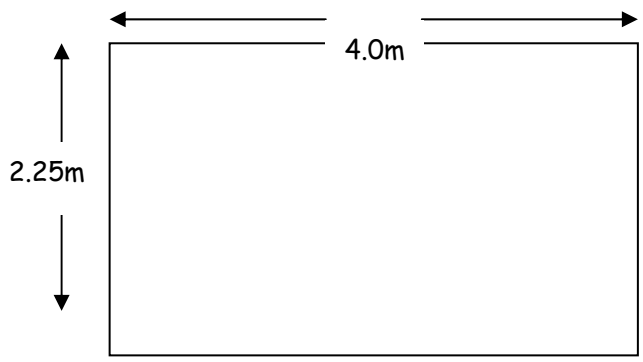
a) Use the equation to calculate the perimeter.

Perimeter = (Wx2) + (Lx2)



b) Use the equation to calculate the area.

W x L = Area



Question 2

A student wants to check her repayments for a student loan now that she has been offered a job. Her starting salary is 15K which is the 'trigger' amount that starts automated repayments. Use the equation below to help calculate her monthly repayments. R = repayments. S = Salary

$$R = \frac{(S - 10\,000) \times 0.09}{12}$$

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N1/L1.11 Solve problems involving algebra.
N1/L2.4 Evaluate expressions & make substitutions in given formulae in words & symbols to produce results.

Equations

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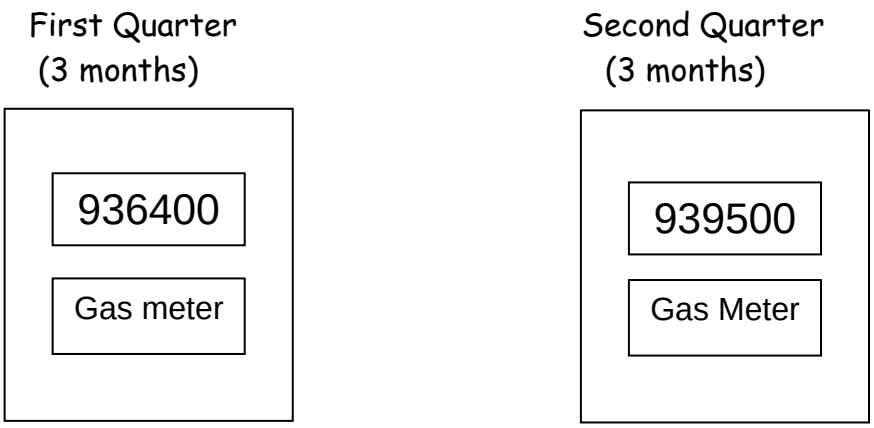
Question 3

A baker makes a chocolate brownie in a flat baking tray measuring 30 ins by 20 ins. He divides the cake into 200 'finger' shaped slices.
He spends £30 on the ingredients and 10 pounds on the packaging.
Calculate the selling price of each brownie using the information below
S = the selling price in pence
C = the cost of the ingredients.(£)
P = the cost of the packaging (£)
N = the number of slices

$$S = \frac{4C + P}{N} \times 100$$

Question 4

You live in rented accommodation.
You have just received a gas bill from your supplier and want to check the calculation.



Calculate the units used on the two meter readings then apply the equation to answer the question.
She uses an estimate of 90 days between the two readings.

$$\text{Cost of gas in pounds} = \frac{8d + u}{100}$$

d = number of days. u = the number of units used

You have a feeling that your bill isn't right.
The bill says that you owe £42.20. Is this right or not?

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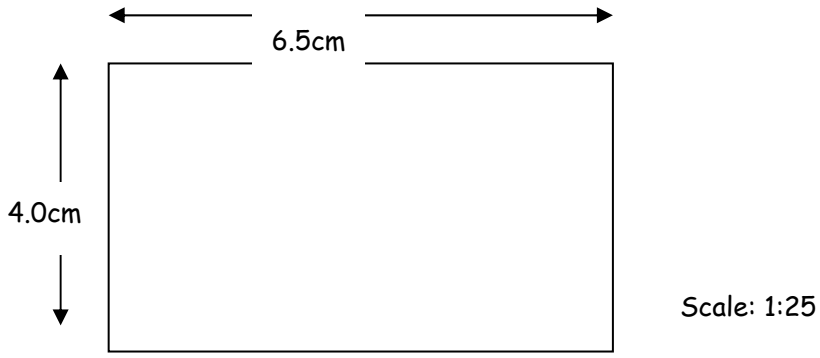
Equations

Name _____ Date_____

Working with scale diagrams – example.

When working with a scale diagram, to calculate the area of a rectangle use this equation.

L x W x Scale Value^2 (use the 'scale' value on the plan, in this case 25)



To calculate the area of the plan using the scale becomes

6.5 x 4.0 x (25^2) = area in real life (in cm^2)
6.5 x 4.0 x 625 = 16250 cm^2

To convert your answer to square metres (m^2) divide the answer by 10 000 (because there are 10 000cm^2 in 1 m^2)

$$\frac{6.5 \times 4.0 \times (25^2)}{10\ 000} = 1.625 \text{ m}^2 \text{ (the area in real life).}$$

Question 5

(Use the example above to help you.)

A farmer has a scale plan of his farmyard. He has a field adjacent to the horse stable where he allows the horses to exercise. The grass in the field needs treating with fertiliser to enhance the growth of the grass for summer grazing. This field is shown on the plan as 8 by 12 centimetres.

The scale of the plan is 1:200
Help the farmer by calculating the area of his field.

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Equations

Answers

1a) (2.5 x 2) + (3.5 x 2) = Perimeter
5 + 7 = **12m**

1b) 2.25 x 4.0 = **9m²**

2) $R = \frac{(S - 10{,}000) \times .09}{12}$

$R = \frac{(15\,000 - 10\,000) \times 0.09}{12}$

$R = \frac{5\,000 \times 0.09}{12}$

R = 450 /12

R = £37.50

3) $S = \frac{4C + P}{N} \times 100$

$S = \frac{(4 \times 30) + 10}{200} \times 100$

$S = \frac{120 + 10}{200} \times 100$

$S = \frac{13000}{200}$

S = 65p

4) Cost of gas in pounds = $\frac{8d + u}{100}$

Units used = 939 500 – 936 400 = 3100

Cost = $\frac{8 \times 90 + 3100}{100}$

Cost = $\frac{720 + 3100}{100}$

Cost = $\frac{3820}{100}$

Cost = £38.20
So the bill is incorrect and is £4 more than it should be. (£42.20 - £38.20 = £4.00)

5) $\frac{8 \times 12 \times 200^2}{10\,000}$

$\frac{96 \times 40000}{10\,000}$

$\frac{3840000}{10\,000}$

= **384m² (the field is 16 m x 24m)**

Main Curriculum References
Question 1 only
N1/L1.11 Solve problems involving algebra
(a) Know how to form word expressions from simple expressions in symbols
(b) Evaluate simple expressions and formulae
(c) Translate simple word problems into symbols (+, -, x and x) and numbers.

Questions 2-5
N1/L2.4 Evaluate expressions and make substitutions in given formulae in words ands symbols to produce results
(a) understand that words and symbols in expressions and formulae represent variable quantities (numbers), not things (i.e. 2a + 2b cannot be explained as 2 apples and 2 bananas)
(b) understand that the contents of brackets must be worked out first
(c) understand that, when there is no operator between a number and a variable, or two variables, multiplication is implied, e.g. 2a = 2 x a; ab = a x b; 2ab = 2 x a x b
(d) understand that, when there is no operator between a number and a bracket, multiplication is implied, e.g. 2(a + b) = 2 x (a + b).

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THANK YOU

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