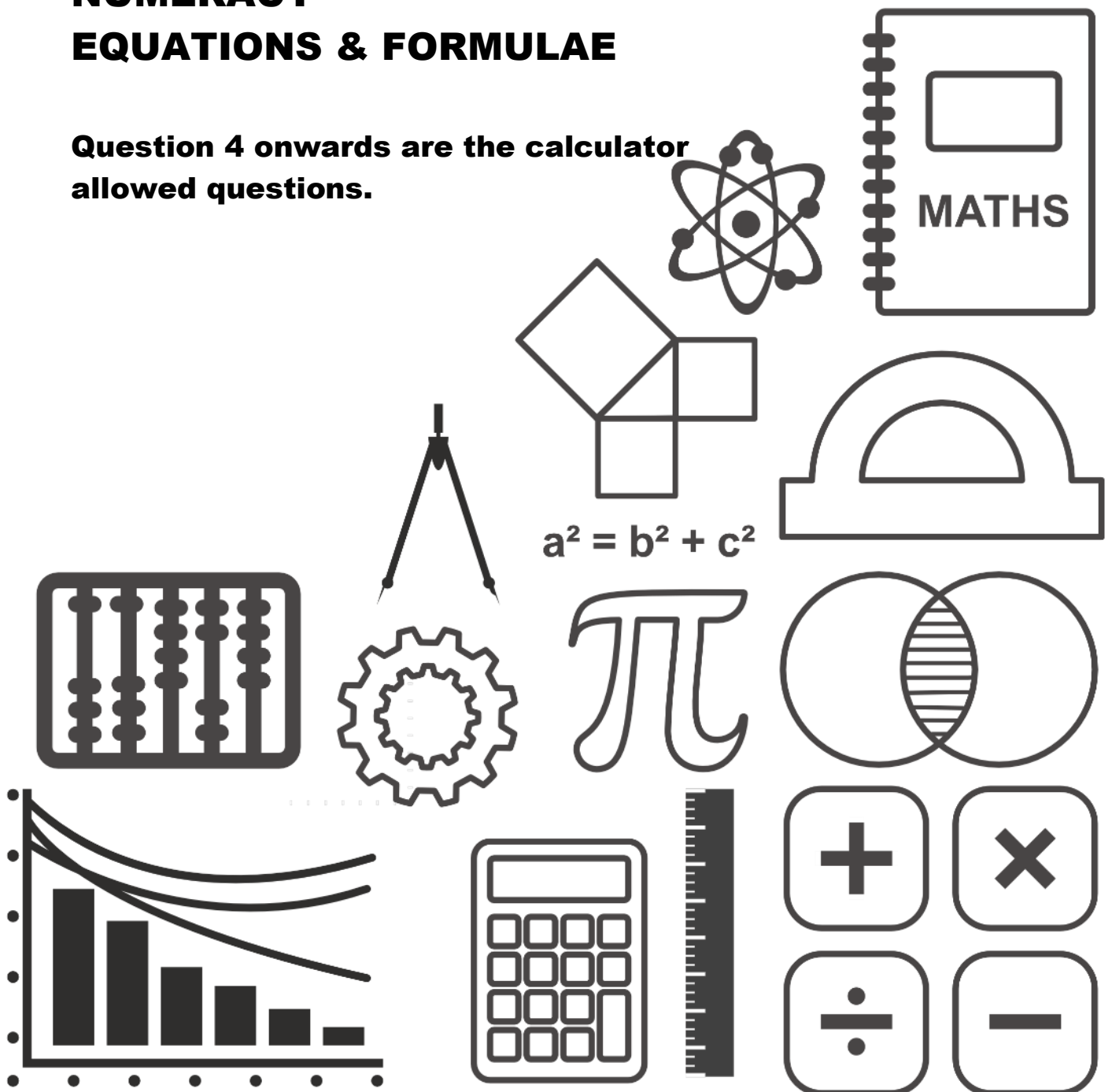
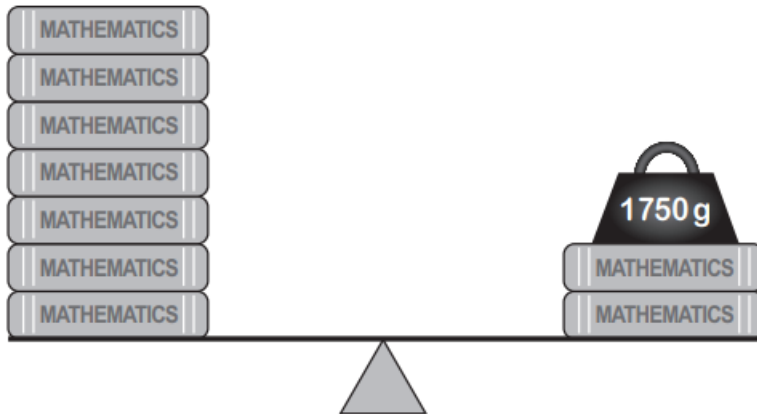


## GCSE TOPIC BOOKLET NUMERACY EQUATIONS & FORMULAE

Question 4 onwards are the calculator allowed questions.



1. Rob puts some books and a weight on a set of balance scales. All the books are identical.



What is the mass of one book? [2]

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Rob balances some identical dictionaries.  
 10 dictionaries are on one side.  
 2 dictionaries and a 3200 g weight are on the other side.

Let the mass of one dictionary be  $x$  grams.

- (i) Use the information above to write an equation in terms of  $x$ . [1]

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- (ii) Find the total mass of **all 12** dictionaries. [2]

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The total mass of all 12 dictionaries is ..... g

2. Bethan builds a rectangular sheep pen.



The perimeter fence of the sheep pen is 18 m long.

Bethan decides to build a new sheep pen.  
The perimeter fence of the new sheep pen is 16 m long.  
The length of the new sheep pen is 3 metres longer than the width.

Form an equation and solve it to find the dimensions of this new sheep pen. [3]

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Length is ..... metres

Width is ..... metres

3. Pairs of shoes are packed in shoeboxes.  
The dimensions of the shoebox used are given on the diagram below.

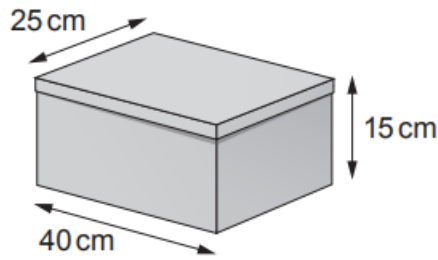


Diagram not drawn to scale

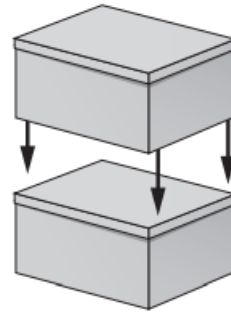
A customer orders 2 pairs of shoes.

The package for sending the shoes to the customer is made by:

- placing one box on top of the other, and
- taping the two boxes together.

This is shown in the diagram.

The cost for sending the package is calculated using the formula below. All dimensions are measured in cm.



$$\text{Cost in } \pounds = \frac{1}{5} \times (S + F) \times 0.02$$

$S$  = value of the sum of the 3 dimensions of the package  
 $F$  = value of the area of one of the **largest** faces of the package

How much does it cost *Rupert Shoes* to send the package?

Give your answer in pounds.

You must show all your working.

[5]

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4. Hot water is often stored in cylinders.  
The water in the cylinder is heated for use in the shower.



A plumbing engineer wants to calculate how long a shower can be used continuously before the water runs cold. He uses the following formulae:

$$C = \frac{H(X - M)}{M - Y} \quad \text{and} \quad T = \frac{C + H}{F}$$

Where:

$C$  is the additional volume of water that feeds into the cylinder, in litres.

$H$  is the volume of hot water that the cylinder holds, in litres.

$M$  is the temperature of the water in the shower, in °C.

$X$  is the temperature of the hot water in the cylinder, in °C.

$Y$  is the temperature of the cold water that feeds into the cylinder, in °C.

$T$  is the time spent using the shower before the water runs cold, in minutes.

$F$  is the rate of flow of water in the shower, in litres per minute.

Daisy's cylinder holds 300 litres of hot water.

The temperature of the hot water in her cylinder is 60°C.

The temperature of the cold water that feeds into Daisy's cylinder is 8°C.

The water in Daisy's shower is set at a temperature of 32°C.

Her shower has a rate of flow of 26 litres per minute.





5. Gustav is making some scones for his sister's birthday party.

Recipe to make 12 scones

450g self raising flour  
 2 teaspoons of baking powder  
 75g butter  
 50g caster sugar  
 2 eggs  
 225ml milk

Bake at **428°F** for 10 to 15 minutes

In the recipe, the temperature of the oven is given in degrees Fahrenheit,  $F$ .  
 The temperature gauge on Gustav's oven shows degrees Celsius,  $C$ .

The formula below is used to convert Fahrenheit into Celsius.

$$C = \frac{5F - 160}{9}$$

At what temperature should Gustav bake the scones?  
 Give your answer in degrees Celsius.

[2]

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..... °C

6. The Headteacher of Ysgol Bro Gwyn investigates building a new bike shed.  
 Bike sheds are built on a rectangular base of width  $x$  metres and length  $y$  metres.

(i) Which is the correct expression for the perimeter of the bike shed?  
 Circle your answer. [1]

- $xy$  metres     
   $xy$  square metres     
   $x + y$  metres     
   $2x + y$  metres     
   $2x + 2y$  metres

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(ii) The Headteacher is given a formula for working out the number of bikes,  $b$ , that can be stored in a bike shed that has a base of width  $x$  metres and length  $y$  metres.

He is told the formula only works when

- $x$  and  $y$  are whole numbers
- $x$  is greater than 3
- $y$  is greater than 5

The formula is as follows:

$$b = \frac{6xy}{5}$$

• According to the formula, how many bikes can be stored in a bike shed 5 metres wide and 8 metres long?  
 Circle your answer. [1]

- 3                     
  7                     
  42                     
  48                     
  240

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• A bike shed  $x$  metres wide and  $y$  metres long can hold  $b$  bikes.  
 According to the details the Headteacher has been given, what is the formula for calculating the length,  $y$  metres?  
 Circle your answer. [1]

- $y = \frac{b-5}{6x}$      
   $x = \frac{6b}{5y}$      
   $y = \frac{b+5}{6x}$      
   $y = \frac{5b}{6x}$      
   $y = \frac{6x}{5b}$

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