Solve problems involving direct proportion

1 A shop sells school supplies.

a) Pens are sold in boxes. Each box contains 12 pens.

12

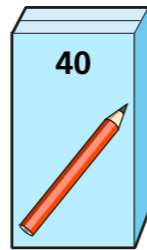How many pens are there in 5 boxes? `60`

How many pens are there in 50 boxes? `600`

How many pens are there in 200 boxes? `2400`

b) Pencils are sold in boxes. Each box contains 40 pencils.

40

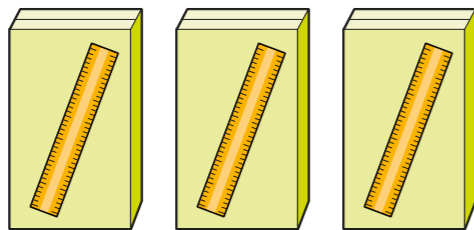How many pencils are there in 4 boxes? `160`

How many pencils are there in 40 boxes? `1600`

How many boxes do you need to buy to have 3,200 pencils? `80`

c) Three boxes of rulers contain 150 rulers altogether.

`1 box    50 rulers`

How many rulers are there in 9 boxes? `450`

How many rulers are there in 27 boxes? `1350`

How many boxes do you need to buy to have 1,500 rulers? `30`

How did you work out your answers? Talk about it with a partner.

2 Here is a recipe for 8 cupcakes.

Cupcakes (makes 8)
100 g butter
100 g sugar
2 eggs
1 tsp vanilla extract
120 g flour
4 tbsp milk

a) Complete these recipe cards.

Cupcakes (makes 4)

`50g`	butter
`50g`	sugar
`1`	eggs
`0.5 tsp`	vanilla extract
`60g`	flour
`2 tbsp`	milk

Cupcakes (makes 24)

`300g`	butter
`300g`	sugar
`6`	eggs
`3 tsp`	vanilla extract
`360g`	flour
`12 tbsp`	milk

Cupcakes (makes `64`)

`800g`	butter
`800g`	sugar
16 eggs	
`8 tsp`	vanilla extract
960 g flour	
`32 tbsp`	milk

b) Mo has half a kilogram of butter. `(500g)`
What is the greatest number of cupcakes he can make using this recipe? `40`

3 At a service station, 6 litres of petrol costs £9

£ 09:00
06:00 litres
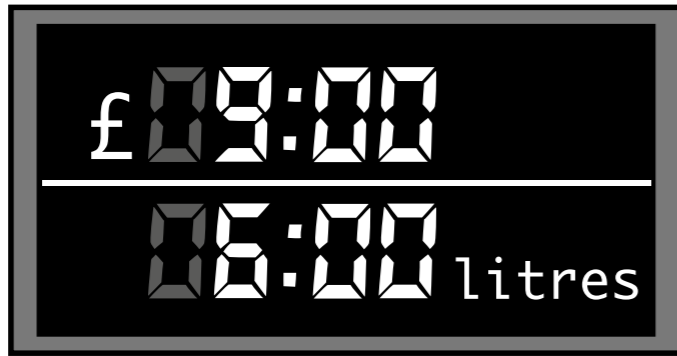
a) How much does 60 litres of petrol cost?

£90

b) How much does 24 litres of petrol cost?

£36

c) How much does 2 litres of petrol cost?

£3

d) How many litres of petrol can you buy for £45?

30L

e) How many litres of petrol can you buy for £4.50?

3L

4 The weight of a piece of rope is in direct proportion to its length.

Complete the table.

Length of rope	Weight of rope
80 m	5 kg
480m	30 kg
20 m	1.25kg
2 m	0.125kg

(annotations: ÷4, ×6, ÷10)

5 Are these statements true or false? Explain your answers.

a) 5 gallons of water weigh 8 lbs, so 25 gallons of water weigh 40 lbs.

True   5×5 = 25
        8×5 = 40

b) 8 chocolate bars cost £5, so 2 chocolate bars cost £1.50

False   4 chocolate bars   £2.50
         2 chocolate bars   £1.25

c) Henry the 8th had 6 wives, so Henry the 4th had 3 wives.

False – this is not a proportion problem.

d) The length of 12 identical toy cars is 132 cm, so the length of 240 of the same toy cars is 26.4 m.

True   12 × 20 = 240
        132cm × 20 = 2640cm = 26.4m

6 40 g of ginger are needed to make 16 gingerbread men.

Annie wants to make 60 gingerbread men.

She has 140 g of ginger. Is this enough? Explain your answer.

Ginger : gingerbread men
40g   :   16   (÷4)
10g   :   4
150g   :   60   (×15)
(÷4, ×15)

No, she is 10g short.

White Rose Maths