

C71 D59 E48 F37 G26



**F**

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
MATHEMATICS SYLLABUS A**

**J512/02**

Paper 2  
(Foundation Tier)

Solutions

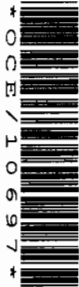
**Monday 1 June 2009  
Morning**

**Duration: 2 hours**

Candidates answer on the question paper

**OCR Supplied Materials:**  
None

- Other Materials Required:**
- Electronic calculator
  - Geometrical instruments
  - Tracing paper (optional)



<b>Candidate Forename</b>		<b>Candidate Surname</b>	
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<b>Centre Number</b>		<b>Candidate Number</b>	
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**MODIFIED LANGUAGE**

**INSTRUCTIONS TO CANDIDATES**

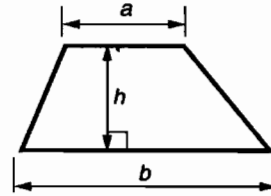
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

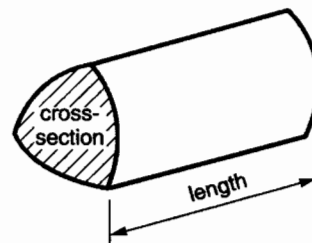
- The number of marks is given in brackets [ ] at the end of each question or part question.
- You are expected to use an electronic calculator for this paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this paper is **100**.
- This document consists of **20** pages. Any blank pages are indicated.

## Formulae Sheet: Foundation Tier

**Area of trapezium** =  $\frac{1}{2}(a + b)h$



**Volume of prism** = (area of cross-section)  $\times$  length



**PLEASE DO NOT WRITE ON THIS PAGE**

1

27	6	11	41	5
20	58	30	16	

From the numbers above write down

(a) the smallest even number,

(a) 6 [1]

(b) the largest odd number,

(b) 41 [1]

(c) two numbers with a total of 31,

(c) 20, 11 [1]

(d) two numbers with a difference of 30,

(d) 41, 11 [1]

(e) a multiple of 10,

(e) 20 or 30 [1]

(f) a factor of 32,

(f) 16 [1]

(g) a prime number,

(g) 5 or 41 [1]

(h) a cube number.

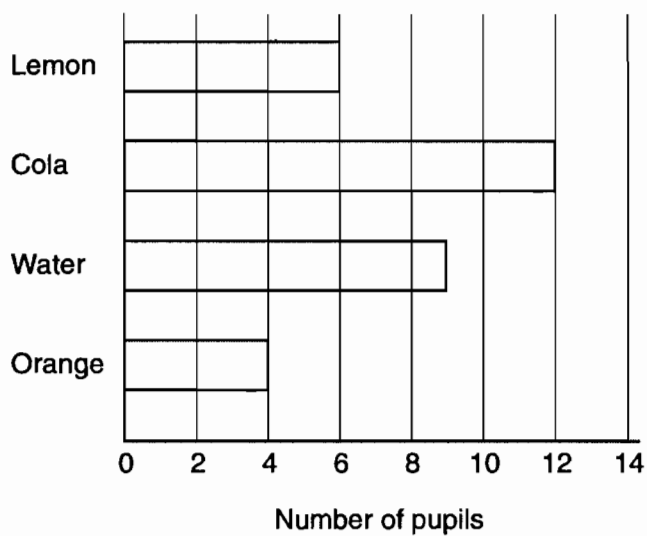
(h) 27 [1]

.....

.....

.....

- 2 Pupils from class 5B went on a school trip. They each chose a drink to take with them. The bar chart shows their choices.



- (a) (i) How many pupils chose Cola?

(a)(i) 12 [1]

- (ii) How many pupils chose Water?

(ii) 9 [1]

There are 33 pupils altogether in class 5B.

- (b) How many pupils from class 5B did not go on the trip?

$$6 + 12 + 9 + 4 = 31$$

$$33 - 31 = 2$$

(b) 2 [2]

- 3 Complete the table so that the fractions, decimals and percentages in each row are equivalent to each other.

Fraction	Decimal	Percentage
$\frac{37}{100}$	0.37	37%
$\frac{53}{100}$	0.53	53%
$\frac{3}{4}$	0.75	75%
$\frac{9}{100}$	0.09	9%

[4]

- 4 Complete these sentences with the correct metric unit.  
Here is an example.

A new pencil is about 16 centimetres long.

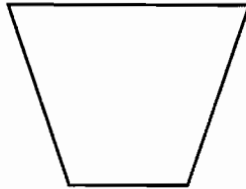
- (a) The distance from London to Brighton is about 80 Kilometres [1]
- (b) The weight of a banana is about 150 grams. [1]
- (c) The capacity of a teacup is about 200 millilitres. [1]
- (d) The weight of a small dog is about 8 Kilograms. [1]

- 5 (a) From this list pick the correct name for each shape.  
Write each answer below the shape.

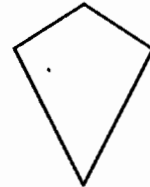
**rhombus    rectangle    kite    trapezium    square    parallelogram**



parallelogram



trapezium

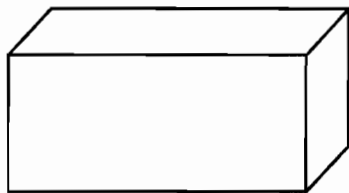


kite

[3]

- (b) From this list pick the correct name for each solid shape.  
Write each answer below the shape.

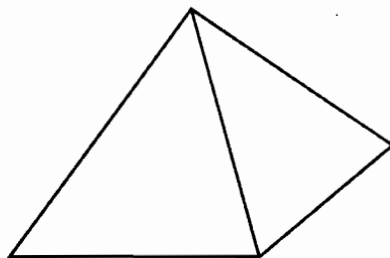
**cylinder    sphere    cube    pyramid    cone    cuboid**



cuboid



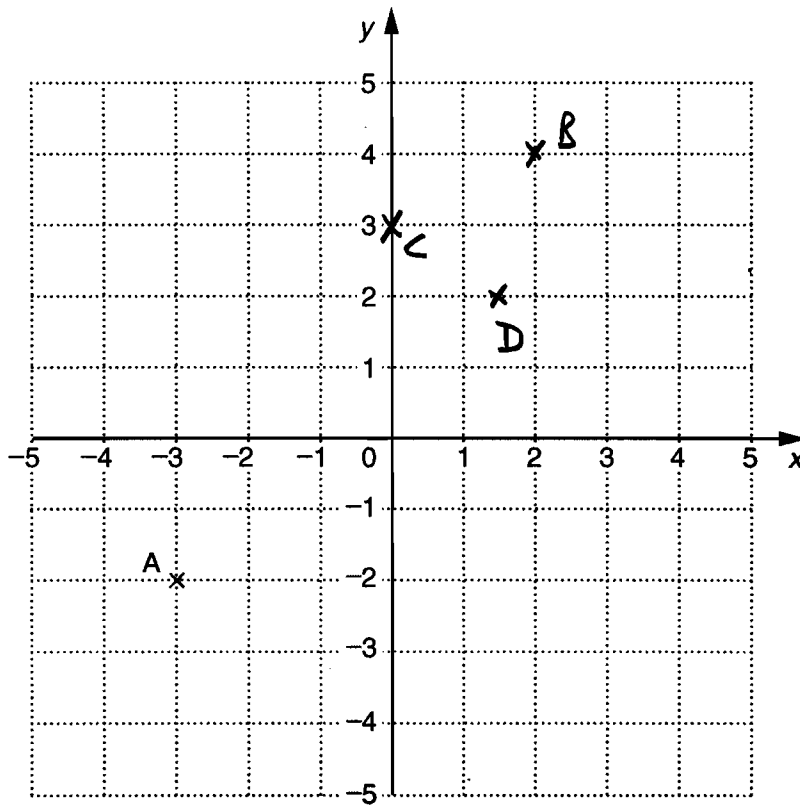
cylinder



pyramid

[3]

6



(a) Write down the coordinates of the point A.

(a) ( -3 , -2 ) [1]

(b) Plot and label the points B(2 , 4), C(0 , 3) and D(1.5 , 2).

[3]

7 Use your calculator to work these out.

(a)  $2.11^2$

(a) 4.4521 [1]

(b)  $\sqrt{2.89}$

(b) 1.7 [1]

(c)  $\frac{3}{5}$  of 220

$220 \times 3 \div 5 = 132$

(c) 132 [2]

8 (a) Fill in the boxes in this pattern.

$2^2 = 1 + 3$

$3^2 = 1 + 3 + 5$

$4^2 = 1 + 3 + 5 + 7$

$5^2 = 1 + 3 + 5 + 7 + 9$

$6^2 = 1 + 3 + 5 + 7 + 9 + 11$

$7^2 = 1 + 3 + 5 + 7 + 9 + 11 + 13$

[4]

(b) Write down the next two numbers in this sequence.

22      21      18      13      6      -3  
 -1      -3      -5      -7      -9

[2]



9 Two fair dice are rolled together.

(a) Complete the table to show the possible totals.

		Number on second dice					
		1	2	3	4	5	6
Number on first dice	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

36 possibilities

[1]

(b) Find the probability that the total is 8.

$$\frac{5}{36}$$

.....

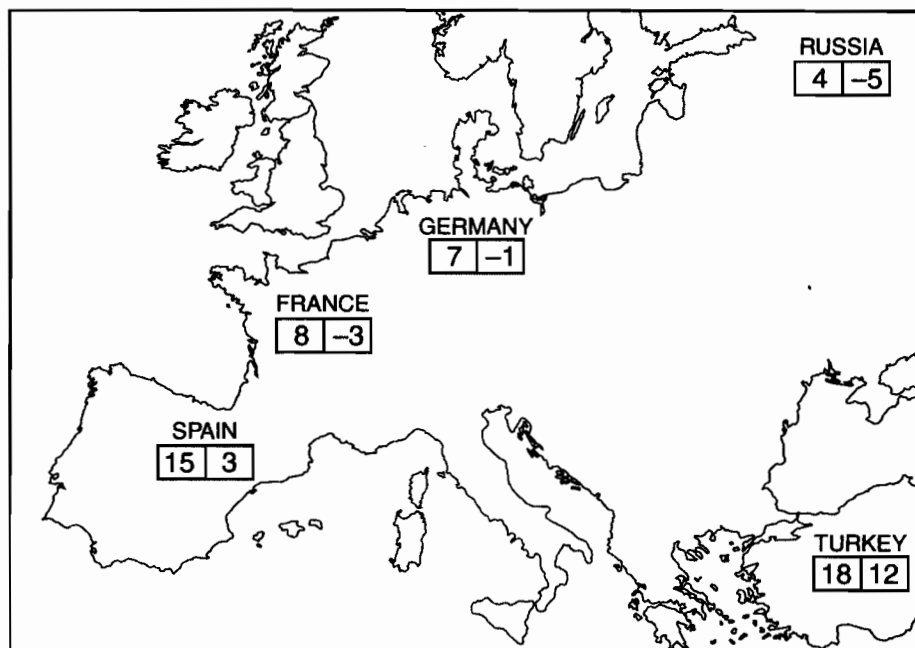
(b)  $\frac{5}{36}$  [2]

(c) Find the probability that the total is greater than 10.

$$\frac{3}{36} = \frac{1}{12}$$

.....

(c)  $\frac{3}{36} = \frac{1}{12}$  [1]



The numbers on the map show the highest and lowest temperatures, in °C, in 5 countries one day last year.

- (a) In which country was the difference between the highest and lowest temperatures equal to 8°C?

$$7 - -1 = 8$$

(a) Germany [1]

- (b) Which country had the lowest temperature overall?

(b) Russia [1]

- (c) Which country's lowest temperature was 6°C below Spain's lowest temperature?

$$3 - 6 = -3$$

(c) France [1]

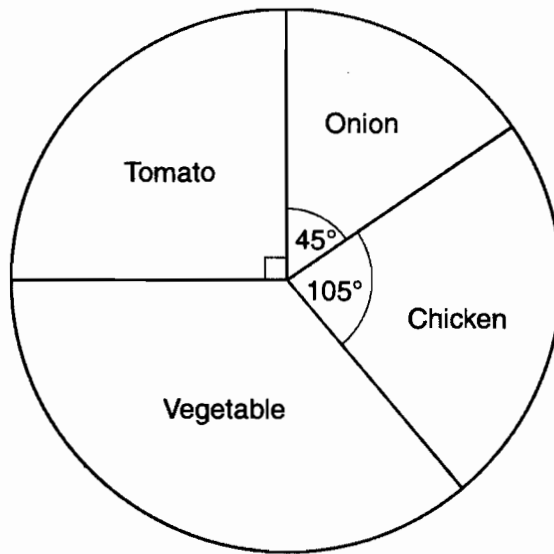
- (d) The next day, Russia's lowest temperature went up by 3°C.

What was Russia's lowest temperature on that day?

$$-5 + 3 = -2$$

(d) -2 °C [1]

- 11 24 pupils were asked to name their favourite soup.  
The pie chart represents the results.



NOT TO  
SCALE

So cannot  
use protractor!

- (a) Work out the size of the angle for Vegetable.

$$90 + 45 + 105 = 240 \quad 360 - 240 = 120$$

(a) 120° [2]

- (b) How many of the 24 pupils chose Onion?

(b) 3 [2]

Fraction is  $\frac{45}{360}$

$$24 \times \frac{45}{360} = 3$$

- 12 Aftab has 600 marbles.  
He gives a quarter of them to Anna.  
He gives a third of them to Winston.

What fraction of the 600 marbles does he have left?

$$\frac{1}{4} + \frac{1}{3} = \frac{3+4}{12} = \frac{7}{12}$$

$$1 - \frac{7}{12} = \frac{5}{12}$$

$$\frac{5}{12}$$

[4]

13 (a) Solve.

(i)  $y - 7 = 3$

$y = 3 + 7$

$y = 10$

(a)(i)  $y = 10$  [1]

(ii)  $3r = 12$

$r = \frac{12}{3}$

$r = 4$

(ii)  $r = 4$  [1]

(iii)  $\frac{t}{4} = 5$

$t = 5 \times 4$

$t = 20$

(iii)  $t = 20$  [1]

(iv)  $12 = 5x + 2$

$12 - 2 = 5x$

$10 = 5x$

$\frac{10}{5} = x$

$2 = x$

(iv)  $x = 2$  [2]

(b) Tony is  $x$  years old.

(i) Alan is 3 years older than Tony.

Write down an expression for Alan's age.

(b)(i)  $x + 3$  [1]

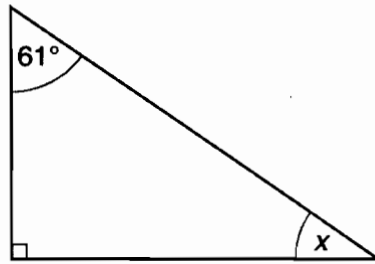
(ii) Ayesha is 4 times as old as Tony.

Write down an expression for Ayesha's age.

(ii)  $4x$  [1]

or  $4 \times x$

- 14 (a) Work out the size of angle  $x$ .



NOT TO  
SCALE

$$90 + 61 = 151^\circ \quad 180 - 151 = 29^\circ$$

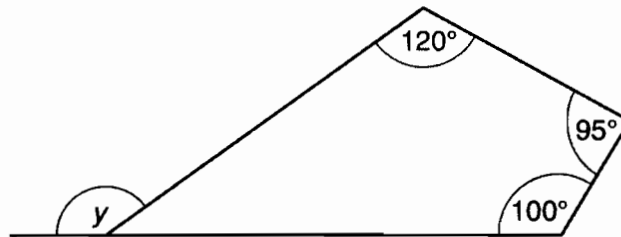
(a)  $x =$  29°

Give, in words, a reason for your answer.

Angles of a triangle add up to  $180^\circ$

[3]

- (b) Work out the size of angle  $y$ .



NOT TO  
SCALE

$$100 + 95 + 120 = 315$$

$$360 - 315 = 45^\circ$$

$$180 - 45 = 135^\circ$$

(b)  $y =$  135°

Give, in words, reasons for your answer.

Angles of a quadrilateral add up to  $360^\circ$

Then angles on a straight line add up to  $180^\circ$  [5]

- 15 Joan has a recipe for making chocolate buns.  
The recipe uses 150g of flour and 25g of cocoa powder to make 12 buns.

(a) How much flour should Joan use to make 18 buns? *For 1 bun  $\div 12$   
then for 18 buns  $\times 18$*

$$150 \div 12 \times 18 = 225$$

(a) 225 g [2]

(b) What is 25g out of 175g expressed as a percentage?

$$\frac{25}{175} \times 100 =$$

(b) 14.3 % [2]

*or 14%  
to nearest percent*

16 Calculate.

(a)  $\frac{22.4}{3.6 + 2.8} = \frac{22.4}{(3.6 + 2.8)}$

*Must use brackets  
to get right answer!*

(a) 3.5 [1]

(b)  $\sqrt{36 + (4.5)^2}$

$$= \sqrt{(36 + 4.5^2)}$$

(b) 7.5 [2]

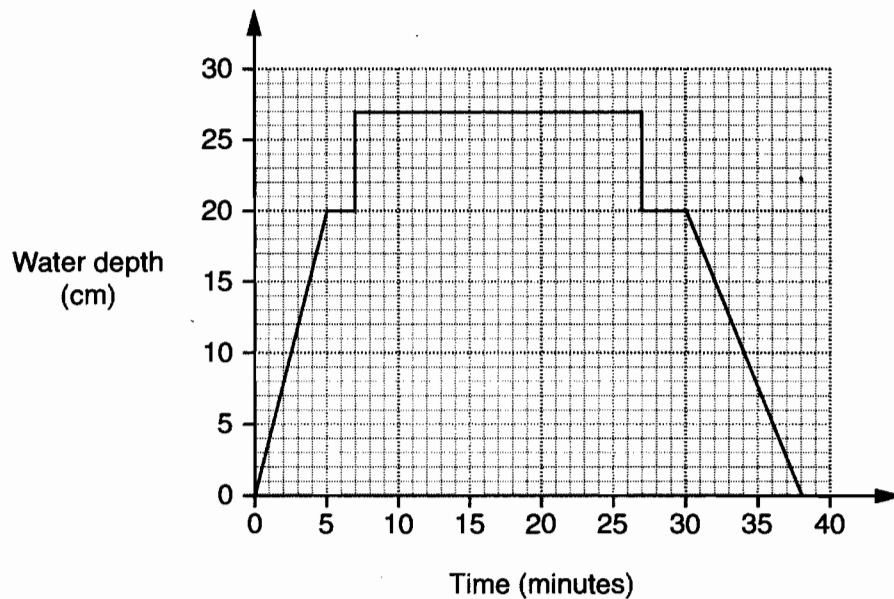
(c) The reciprocal of 0.16.

*reciprocal of  $x$  is  $\frac{1}{x}$*

$$\text{so } \frac{1}{0.16} = 6.25$$

(c) 6.25 [1]

- 17 Rachael decides to bath her dog, Oscar. She runs water into the bath, puts Oscar in the bath, baths Oscar, takes him out and then empties the bath. The graph shows the depth of water in the bath.



- (a) Which is quicker, running water into the bath or emptying it?  
Explain how you can tell.

running water quicker  
tell by steeper slope of graph [1]

- (b) By how much does the depth of the water increase in one minute as water runs into the bath?

20 cm in 5 min so 4 cm in 1 min  
(b) 4 cm [1]

- (c) For how long was Oscar in the bath?

27 - 7 = 20 min  
(c) 20 minutes [1]

- (d) The volume of the bath water was  $119600\text{cm}^3$ .

Change  $119600\text{cm}^3$  into litres.  $1000\text{cm}^3 = \text{litre}$   
 $119600 \div 1000 = 119.6 \text{ litres}$

(d) 119.6 litres [1]

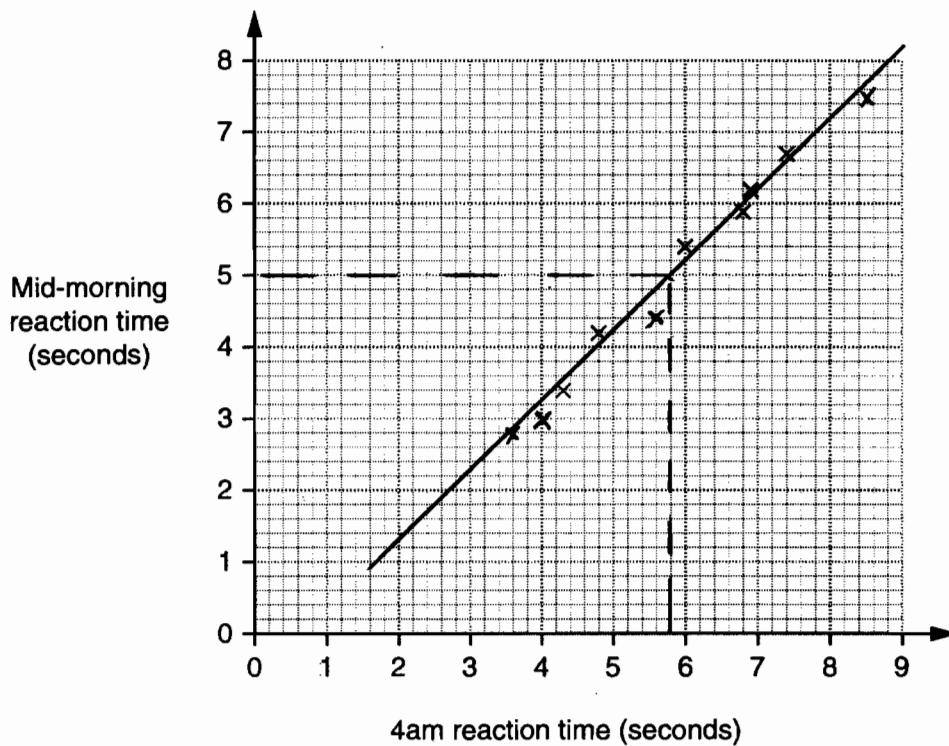


- 18 Sally conducted an experiment on reaction times. One day ten students were woken at 4 am and their reaction times were measured. Another day their reaction times were measured mid-morning after a full night's sleep.

The reaction times, in seconds, are shown in the table.

Student	A	B	C	D	E	F	G	H	I	J
4 am reaction time	4.3	6.8	6.9	7.4	6.0	4.8	5.6	4.0	8.5	3.6
Mid-morning reaction time	3.4	5.9	6.2	6.7	5.4	4.2	4.4	3.0	7.5	2.8

The scatter graph shows the reaction times for students A to F.

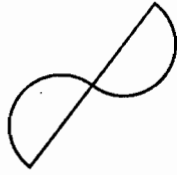


- (a) Complete the scatter graph. [2]
- (b) Describe the correlation shown.  
Positive correlation [1]
- (c) Draw a line of best fit on your graph. [1]
- (d) Another student, John, has a mid-morning reaction time of 5.0 seconds.

Use your line of best fit to estimate John's reaction time if he was woken at 4 am.

(d) 5.8 s [1]

- 19 This logo is made using two semicircles, each with a radius of 6 cm.



Straight line  
is  $4 \times \text{radius}$   
 $= 4 \times 6 = 24 \text{ cm}$

Work out the **perimeter** of the logo.  
Give the units of your answer.

Curved bit is

circumference of one full circle  
with radius 6 cm  $2\pi r = 2 \times \pi \times 6$   
 $= 37.7 \text{ cm}$

TOTAL PERIMETER =  $24 + 37.7 = 61.7 \text{ cm}$  [4]

- 20 The capacity of a tank is 8 gallons.  
The empty tank was filled with petrol.  
The petrol cost 123.9 pence per litre.  
1 litre is approximately equal to 0.22 gallons.

Calculate how much it cost to fill the tank with petrol.  
Give your answer to an appropriate degree of accuracy.

Find how many litres in 8 gallons

$$\frac{8}{0.22} = 36.364 \text{ litres}$$

$$\begin{aligned} \text{Cost } 36.364 \times 123.9 \text{ p} \\ = 4505.4996 \text{ p} \\ = \pounds 45.05 \end{aligned}$$

£ 45.05 [4]

- 21 Use trial and improvement to solve this equation.

$$x^3 - x = 10$$

Give your answer to one decimal place.  
Show all your trials and their outcomes.

$$2^3 - 2 = 6$$

$$3^3 - 3 = 24$$

$$2.5^3 - 2.5 = 13.125$$

$$2.3^3 - 2.3 = 9.867$$

$$2.4^3 - 2.4 = 11.424$$

$$2.35^3 - 2.35 = 10.63$$

2.35 too big so round down to  $x = 2.3$

$$\underline{x = 2.3}$$

[4]