Bishops Online Tutoring

Education Consultancy

Edexcel GCSE Mathematics
TRIAL & IMPROVEMENT

Materials Required:

- Pen
- HB Pencil
- Ruler (in centimetres and millimetres)
- Protractor
- Compass

Instructions:

- Use a black ink pen to answer all questions
- Fill your name in the section below
- Answer the questions in the spaces provided
- Show your working out for all answers

Information:

- The marks allocated for each question are displayed within brackets – utilise this information to gauge the appropriate amount of time to dedicate to each question
- Questions marked with an asterisk (*) will assess your written communication; be careful of spelling, punctuation and grammar with these questions

Advice:

- Carefully read the question before attempting to answer it
- Be vary of time and try to answer every question
- If you have enough time in the end, go back and check your answers. A good way to check your answers is to retry the question with the hope of getting the same answer as before without looking at your working out from before

CALCULATOR ALLOWED

NAME:	

1. The equation $x^3 + 3x = 41$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **all** your working.

x	Working out	Big or small?
3.5	$3.5^3 + 3 \times 3.5 = 53.375$	Too Big
3.3	$3.3^3 + 3 \times 3.3 = 45.837$	Too big
3.1	$3.1^3 + 3 \times 3.1 = 39.09$	Too small
3.2	$3.2^3 + 3 \times 3.2 = 42.368$	Too Big
3.15	$3.15^3 + 3 \times 3.15 = 40.7$	Too small
3.18	$3.18^3 + 3 \times 3.18 = 41.69$	Too big

Between these two

Closer to 3.2

$x =$ 3.2

(4 marks)

2. The equation

$$x^3 - 6x = 72$$

has a solution between 4 and 5

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **all** your working.

x	Working out	Big or small?	
4.5	$4.5^3 - 6 \times 4.5 = 64.125$	Too small	
4.8	$4.8^3 - 6 \times 4.8 = 81.792$	Too big	
4.7	$4.7^3 - 6 \times 4.7 = 75.623$	Too big	Between these two
4.6	$4.6^3 - 6 \times 4.6 = 69.736$	Too small	Between these two
4.65	$4.65^3 - 6 \times 4.65 = 72.64$	Too big	
4.63	$4.63^3 - 6 \times 4.63 = 71.47$	Too small	

Closer to 4.6

$x =$ 4.6

(4 marks)

3. The equation

$$x^3 - 3x = 15$$

has a solution between 2 and 3

Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show **all** your working.

x	working out	small or big
2.5	$2.5^3 - 3 \times 2.5 = 8.125$	Too small
2.7	$2.7^3 - 3 \times 2.7 = 11.583$	Too small
2.8	$2.8^3 - 3 \times 2.8 = 13.552$	Too small
2.9	$2.9^3 - 3 \times 2.9 = 15.689$	Too big
2.85	$2.85^3 - 3 \times 2.85 = 14.599$	Too small
2.87	$2.87^3 - 3 \times 2.87 = 15.0299$	Too Big

$x =$ 2.9

(4 marks)

4. The equation

$$x^3 + 5x = 67$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

x	Working out	Big or Small
3.5	$3.5^3+5\times3.5=60.375$	Too small
3.7	$3.7^3+5\times3.7=69.153$	Too Big
3.6	$3.6^3+5\times3.6=64.656$	Too small
3.65	$3.65^3+5\times3.65=66.877$	Too small
3.68	$3.68^3+5\times3.68=68.236$	Too Big

$x =$ 3.6

(4 marks)

5. The equation

$$x^3 + 2x = 42$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

x	Working out	Small or big
3.5	$3.5^3 + 2 \times 3.5 = 49.875$	Too big
3.3	$3.3^3 + 2 \times 3.3 = 42.537$	Too big
3.2	$3.2^3 + 2 \times 3.2 = 39.168$	Too small
3.25	$3.25^3 + 2 \times 3.25 = 40.828$	Too small
3.27	$3.27^3 + 2 \times 3.27 = 41.5058$	Too small

$x =$ 3.3

(4 marks)

6. The diagram shows a cuboid.

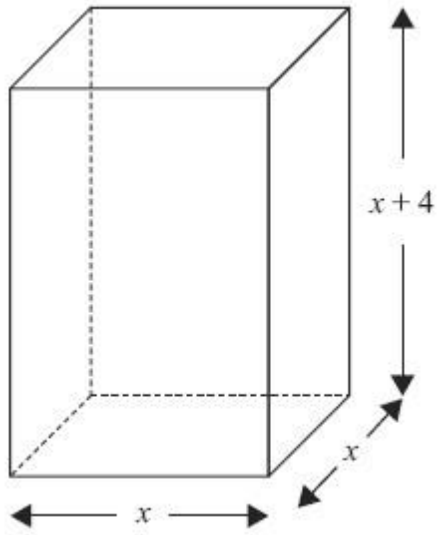


Diagram **NOT** accurately drawn

A cuboid has a square base of side x cm.
The height of the cuboid is $(x + 4)$ cm.
The volume of the cuboid is 150 cm^3.

(a) Show that $x^3 + 4x^2 = 150$

(2)

$x \times x(x+4) = x^2(x+4) = 150$

$x^3 + 4x^2 = 150$

The equation $x^3 + 4x^2 = 150$ has a solution between 4 and 5

(b) Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show ALL your working.

(4)

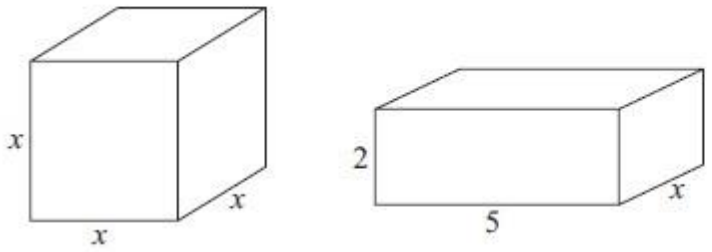
x	working out	Big or Small
4.5	$4.5^3 + 4 \times 4.5^2 = 172.125$	Too big
4.3	$4.3^3 + 4 \times 4.3^2 = 153.467$	Too big
4.2	$4.2^3 + 4 \times 4.2^2 = 144.648$	Too small
4.25	$4.25^3 + 4 \times 4.25^2 = 149.0156$	Too small
4.27	$4.27^3 + 4 \times 4.27^2 = 150.786$	Too big

$x =$ 4.3cm

(6 marks)

7. The diagram shows a cube and a cuboid.

Diagram **NOT** accurately drawn



All the measurements are in cm.
The volume of the cube is 100 cm^3 more than the volume of the cuboid.

(a) Show that $x^3 - 10x = 100$

Volume of cuboid = 2 × 5 × x
= 10x

Volume of cube = 100 + 10x
= x 3

$x^3 = 100 + 10x$ (−10x)
$x3 - 10x = 100$

(2)

(b) Use a trial and improvement method to find the value of x.
Give your answer correct to 1 decimal place.
You must show **all** your working.

x	Working out	Small or big
5	$5^3 - 10 \times 5 = 75$	Too small
6	$6^3 - 10 \times 6 = 156$	Too big
5.5	$5.5^3 - 10 \times 5.5 = 111.375$	Too big
5.3	$5.3^3 - 10 \times 5.3 = 95.877$	Too small
5.4	$5.4^3 - 10 \times 5.4 = 103.464$	Too big
5.35	$5.35^3 - 10 \times 5.35 = 99.63$	Too small
5.37	$5.37^3 - 10 \times 5.37 = 101.15$	Too big

$x =$ 5.4 cm

(4)

(6 marks)