



Trial and improvement

About 50 minutes Calculator allowed 46 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** Last lesson [2 marks]
 $P = 5a - 3b$. Find b when $P = 11$ and $a = 1$.
Solve $3x - 1 > x - 7$.

Answer

Answer

- A3** From chapter 11 [2 marks] **A4** From chapter 13 [2 marks]
A rectangle has a diagonal of 29 cm and one side of 21 cm. Find its area.
Of 47 students, 23 are boys and the rest are girls. 20 of the boys and 12 of the girls walk to school. A student who walks is chosen at random. Find the probability that it is a boy.

Answer

Answer

B Examples, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Show that $x^3 + 4x = 60$ has a solution between 3 and 4.**Hint** Work out the left-hand side at 3 and at 4.

- B1** [2 marks]
Between which two consecutive whole numbers is the solution of $x^3 - x = 100$?

Answer

EXAMPLE 2

Use trial and improvement to solve $x^3 + 4x = 60$. Give your answer to 1 decimal place.**Hint** After trapping it between two tenths, try the value halfway.

- B2** [3 marks]
Use trial and improvement to solve $x^3 - x = 100$. Give your answer to 1 decimal place. You must show your working.

Answer

EXAMPLE 3

Solve $x^3 = 5x + 30$ by trial and improvement, to 1 decimal place.

Hint Take $5x$ from both sides first: $x^3 - 5x = 30$.

B3 Solve $x^3 = 8x + 15$ by trial and improvement. Give your answer to 1 decimal place. [3 marks]

Answer

c Practice

C1 The equation $x^3 + 9x = 88$ has a solution between 3.7 and 3.8. [3 marks]
Find it correct to 2 decimal places.

Answer

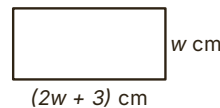
C2 Use trial and improvement to solve $3^x = 40$. Give your answer to 1 decimal place. [3 marks]

Answer

C3 The equation $x^3 + 5x = -20$ has a solution between -3 and -2 . [3 marks]
Find it to 1 decimal place.

Answer

C4 A rectangle is 3 cm longer than twice its width. Its area is 50 cm^2 . Use trial and improvement to find its width w , to 1 decimal place. [3 marks]



Not drawn accurately

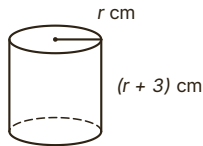
Answer

D Exam-style questions

D1 Jo solves $x^3 - 7x = 57$. She finds that 4.4 gives 54.384 and 4.5 gives 59.625. She says, "The answer to 1 decimal place is 4.4, because 54.384 is closer to 57." [3 marks]

Is Jo right? You must show your working.

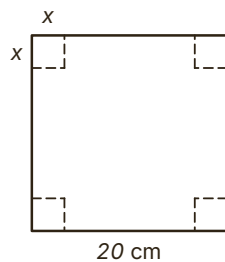
- D2** A cylinder has radius r cm, height $(r + 3)$ cm and volume 400 cm^3 . Use trial and improvement to find r to 1 decimal place. Show your working. [4 marks]



Not drawn accurately

Answer

- D3** A square sheet of card has side 20 cm. A square of side x cm is cut from each corner, and the sides are folded up to make an open box. The volume of the box is 400 cm^3 .



Not drawn accurately

- (a) Show that $x^3 - 20x^2 + 100x = 100$. [3 marks]
- (b) The smaller value of x that works lies between 1 and 2. Use trial and improvement to find it. Give your answer to 1 decimal place. You must show your working. [4 marks]

Answer

Total for D3: 7 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** The equation $x^3 - 12x = 5$ has a solution between -1 and 0 . Find it correct to 1 decimal place. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Work out $x^3 - 12x$ at $x = -1$ and at $x = 0$. Which way does it change?
- Hint 2** Here the value goes DOWN as x goes up, so a value that is too big means x is too small.
- Hint 3** Test -0.4 , -0.5 and then -0.45 .

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can trap a root between two whole numbers. ☐ ☐ ☐

I can close in on it one decimal place at a time. ☐ ☐ ☐

I can test the halfway value to round correctly. ☐ ☐ ☐