Trial and Improvement

Past Paper Questions

6 Explain why $2x^3 + x^2 - x = 50$ has a solution between $x = 2{\cdot}8$ and $x = 2{\cdot}9$.
Show all your calculations.

[2] 2009*

11 A solution to the equation $2x^3 - 7x - 22 = 0$ lies between 2 and 3. Use the method o: and improvement to find this solution correct to 1 decimal place.

[4] 2008*

7 A solution to the equation $x^3 - 2x - 50 = 0$ lies between 3.8 and 3.9
Use the method of trial and improvement to find this solution correct to two decimal places.

[4] 2007*

11 A solution to the equation $3x^3 - 2x - 3 = 0$ lies between 1 and 2. Use the method of trial and improvement to find this solution correct to1 decimal place.

[4] 2006*

12 A solution to the equation $x^3 - 2x = 33$ lies between 3.4 and 3.5.

Use the method of trial and improvement to find this solution correct to 2 decimal places.

[4] 2005*

(6)

x	$2x^3 + x^2 - x$	
2.8	$2(2.8)^3 + (2.8)^2 - 2.8 = 48.944$	Too Small
2.9	$2(2.9)^3 + (2.9)^2 - 2.9 = 54.288$	Too Big

∴ Solution between 2.8 & 2.9

(11)

x	$2x^3 - 7x - 22 = 0$	
2.5	$2(2.5)^3 - 7(2.5) - 22 = -8.25$	Small
2.6	$2(2.6)^3 - 7(2.6) - 22 = -5.048$	Small
2.7	-1.534	Small
2.8	2.304	Big
2.75	0.34375	Big

Between 2.7 & 2.75

$x = 2.7$ (1dp)

(7.)

x	$x^3 - 2x - 50$	
3.85	-0.633375	Small
3.86	-0.207544	Small
3.87	0.220603	Big
3.865	0.00623	Big

Between

$x = 3.86$ (2dp)

(11.)

x	$3(x)^3 - 2x - 3$	
1.5	$3(1.5)^3 - 2(1.5) - 3 = 4.125$	Big
1.3	0.991	Big
1.2	-0.216	Small
1.25	0.359	Big

Between

$x = 1.2$ (1dp)

(12)

x	$x^3 - 2x = 33$	
3.45	$3.45^3 - 2 \times 3.45 = 34.163625$	Big
3.44	33.827584	Big
3.43	33.49	Big
3.42	33.16	Big
3.41	32.83	Small
3.45	33.53	Big

Between

$x = 3.41$ (2dp)

REVISION TOPIC:- TRIAL AND IMPROVEMENT

NAME ..... Write your answers on these sheets. **Calculators allowed.**

1) Solve the following equations to 1 decimal place by using trial and improvement.

a) $x^2 + x = 200$.

x	$x^2 + x$	
14	$14^2+14 = 210$	Big
13	$13^2+13 = 182$	Small.
13.5	$13.5^2+13.5 = 195.75$	Small
13.6	198.56	Small
13.7	201.39	Big
13.65	199.97	Small ← Between

Answer: x = ...13.7..... (to 1 decimal place).

b) $x^2 + 5x = 105$.

x	$x^2 + 5x$	
9	$9^2+5\times9 = 126$	Big
8	$8^2+5\times8 = 104$	Small.
8.2	108.24	Big
8.1	106.11	Big
8.05	105.05	Big ← Between

Answer: x = ...8.0..... (to 1 decimal place).

2) A solution of the equation $x^3 + 2x = 43$ lies between $x = 3$ and $x = 4$.

Find an approximate solution to 1 decimal place.

x	$x^3 + 2x$	
3.5	$3.5^3+2\times3.5 = 49.875$	Big
3.4	46.104	Big
3.3	42.537	Small ← Between
3.35	44.92	Big

Answer: x = ...3.3..... (to 1 decimal place).

3) A solution of the equation $x^3 - 2x - 12 = 0$ lies between $x = 2$ and $x = 3$.

Use the method of trial and improvement to find this solution correct to one decimal place.

x	$x^3 - 2x - 12$	
2.5	$(2.5)^3-2(2.5)-12 = -1.375$	Small.
2.6	$(2.6)^3-2(2.6)-12 = 0.376$	Big
2.55	$(2.55)^3-2(2.55)-12 = -0.5186$	Small

Between 2.55 & 2.6 ∴

Answer: x = ...2.6..... (to 1 decimal place).