

Algebra Diagnostic test

1. Write down the next 3 terms and the rule for each sequence:

- a) 5, 8, 11, 14..... **17, 20, 23 $T_n = 3n+2$**
- b) 1, 3, 8, 15, ... **24, 35, 48 $T_n = n^2-1$**
- c) 3, 9, 27, 81..... **243, 729, 2187 $T_n = 3^n$**

2. Draw the graph of $y = x^2 + x$, filling in the table of values to establish points:

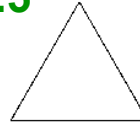
x	-3	-2	-1	0	1	2	3
y	6	2	0	0	2	6	12

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Use your graph to find solutions to $x^2 + x = 0.5$

$x = -1.5$ or $x = 0.5$

3.



The square has sides of length x and the triangle has height 8cm and base length 4cm. They both have the same area.

- a) Make an equation in x .
- b) Solve the equation to find x

**$x^2 = 0.5 \times 8 \times 4 = 16$
 $x = 4$**

4. multiply out

- a) $7(3x + 5) = 21x + 35$
- b) $(x + 5)(x - 3) = x^2 + 2x - 15$
- c) $(x - 6)^2 = x^2 - 12x + 36$
- b) $4x^2 - 12x = 4x(x - 3)$
- c) $x^2 + 6x + 8 = (x + 4)(x + 2)$
- d) $x^2 - 36 = (x + 6)(x - 6)$

6. Simplify:

- a) $4a + 8b - 5a + 12b = 20b - a$
- b) $2a \times a \times 4a \times a = 8a^4$
- c) $27^{1/3} = 3$

7. If $a = 4$, $b = -2$ and $c = 10$ find the value of:

- i) $ab = -8$
- ii) $a + b = 2$
- iii) $c\sqrt{a} = 20$
- iv) $a^{0.5} = 1$
- v) $-1/2$

$x^2 - 3x - 4 = 0$

**$(x - 4)(x + 1) = 0$
 $x = 4$ or $x = -1$**

10. Solve the simultaneous equations:

**$3x - 2y = 8$
 $x + 4y = 5$
 $x = 3, y = 0.5$**

9. Solve the equations:

- a) $5x - 4 = 21$ **$x = 5$**
- b) $2x + 1 = 3x - 2$ **$x = 3$**
- c) $10 - 4x = 8$ **$x = 1/2$**
- d) $\frac{3}{x} = 12$ **$x = 1/4$**

12. $x^3 + 1 = 30$ has a solution between $x = 3$ and $x = 4$. Find the solution to 1 d.p.

11. On axes shade the area for which $y + x > 7$ and $x < 2$. **2 pages on**

5. Factorise:

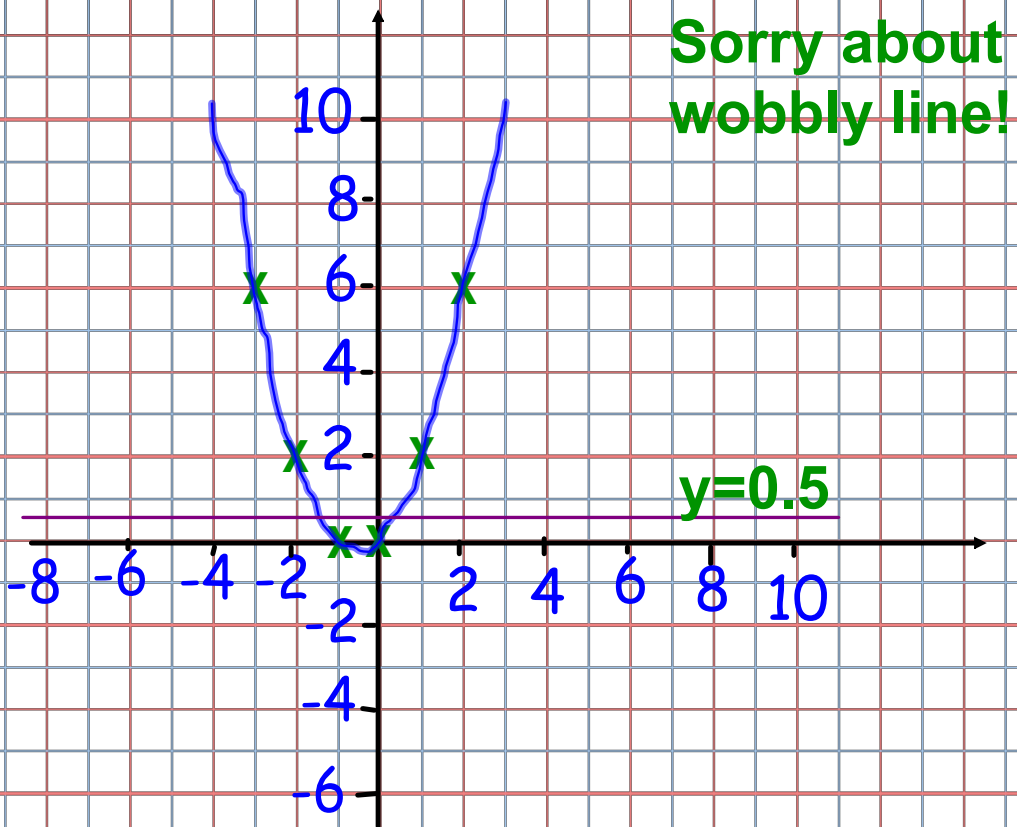
a) $3x + 15 = 3(x + 5)$

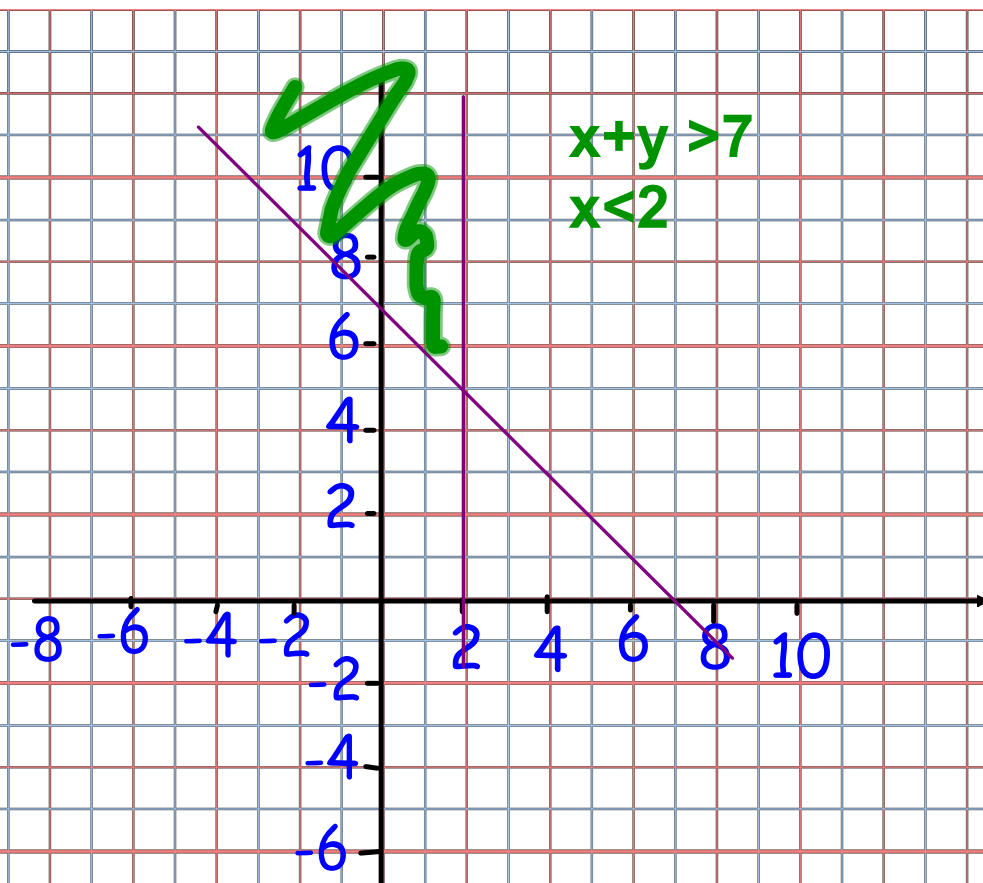
12. Solve the equation $2x^2 + 6x - 10 = 0$

**$x = \frac{-6 \pm \sqrt{(36 + 80)}}{4}$
 $= 1.19$ or -4.19**

x	$x^3 + 1$	30
3.5	43.8	tb
3.2	33.76	tb
3.1	30.79	tb
3.05	29.37	ts

**x is between 3.05 and 3.1 so
 $x = 3.1$ to 1 dp**





13. Make a the subject:

a) $3a - 2b = 7$

$$3a = 7 + 2b$$

$$a = \frac{7 + 2b}{3}$$

b) $4a^2 b - 2 = c$

$$4a^2 b = c + 2$$

$$a^2 = \frac{c + 2}{4b}$$

$$a = \sqrt{(c + 2) / 4b}$$

c) $\frac{5}{\sqrt{a}} = b$

$$5 = b\sqrt{a}$$

$$\frac{5}{b} = \sqrt{a}$$

$$\frac{25}{b^2} = a$$

Simplify:

$$\frac{6x + 9}{4x^2 - 9} = \frac{3(2x + 3)}{(2x + 3)(2x - 3)} = \frac{3}{2x - 3}$$

15. Sketch the graph of $y = x^3$
Hence or otherwise sketch the graph of
 $y = (x - 3)^3$.

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