

**Maths Revision
Booklet**

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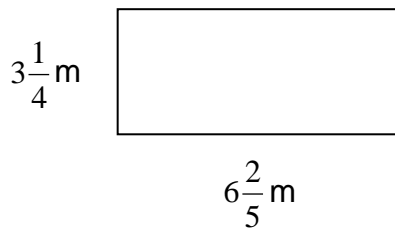
Numerical & Algebraic Fractions

1. Calculate the value of these, giving your answers in their simplest form:

a) $\frac{3}{7} + \frac{5}{6}$ b) $3\frac{5}{9} + 4\frac{3}{8}$ c) $\frac{9}{11} - \frac{2}{3}$ d) $5\frac{7}{8} - 3\frac{2}{9}$

e) $\frac{4}{5} \times \frac{25}{32}$ f) $1\frac{1}{9} \times 3\frac{2}{5}$ g) $\frac{8}{15} \div \frac{4}{9}$ h) $4\frac{2}{3} \div 1\frac{1}{7}$

2. Find the perimeter and area of the rectangle below:



3. Simplify:

a) $\frac{3b}{12b^2}$ b) $\frac{(x+1)(x+5)}{(x+2)(x+5)}$ c) $\frac{(a+b)^3}{(a+b)(a-b)}$ d) $\frac{6(x+3)(2x-7)}{15(2x-7)^2}$

4. a) Factorise $x^2 - 9$
 b) Factorise $x^2 - 2x - 15$
 c) Hence write $\frac{x^2 - 9}{x^2 - 2x - 15}$ as a fraction in its simplest form.

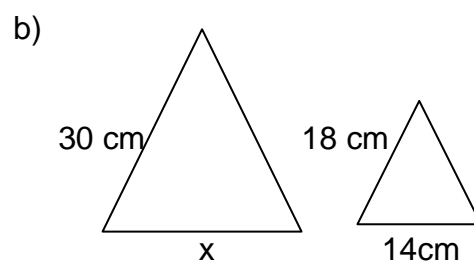
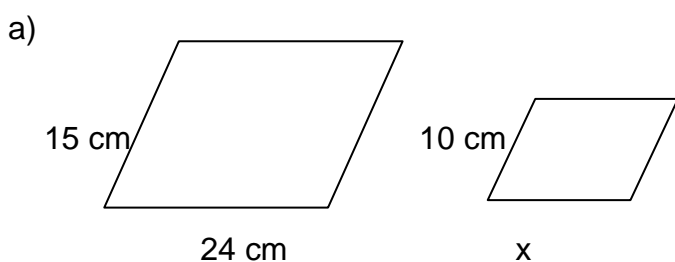
5. Write a s a single fraction:

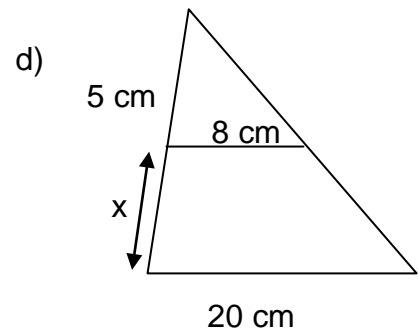
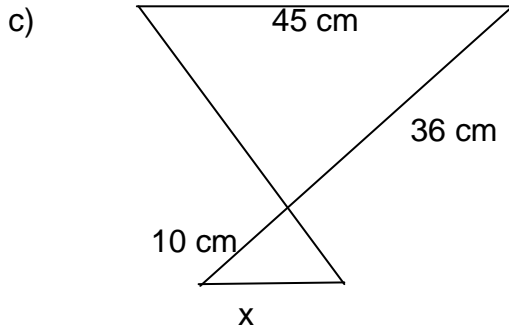
a) $\frac{a}{h} + \frac{b}{m}$ b) $\frac{r}{k} - \frac{3}{p}$ c) $\frac{5}{x+2} + \frac{3}{x+1}$ d) $\frac{10}{x-6} - \frac{5}{x}$

e) $\frac{k}{n} \times \frac{3}{g}$ f) $\frac{(w+1)^2}{5} \times \frac{15}{(w+1)}$ g) $\frac{p}{k} \div \frac{5}{d}$ h) $\frac{6}{(d-5)^3} \div \frac{15h}{(d-5)}$

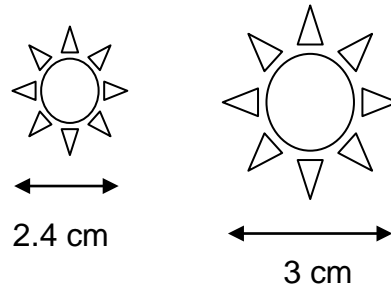
Similarity

6. Find the missing value, x , in each pair of similar figures below:

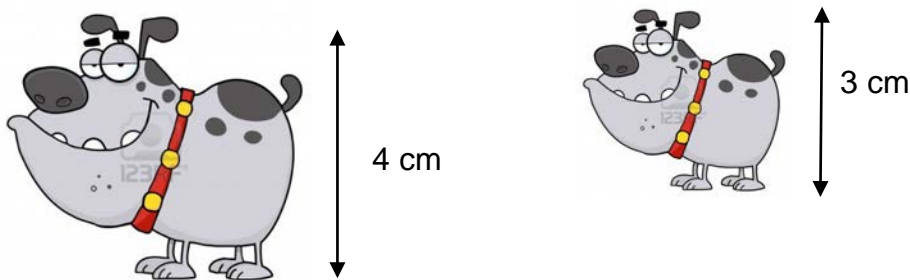




7. Two pendants are similar in shape. If the smaller pendant has an area of 11.8 cm^2 , find the area of the larger pendant.



8. Two dog fridge magnets are similar in shape. If the larger magnet has an area of 24 cm^2 find the area of the smaller magnet.



10. Two candles are similar in shape. If the smaller candle has a volume of 48 cm^3 , find the volume of the larger candle.



11. Two traffic cones are mathematically similar. The larger cone has a volume of 4500 cm^3 , find the volume of a smaller cone which is half the height.

Completing the Square

12. Complete the square for each example below to give your answer in the form $y = (x + a)^2 + b$.

a) $y = x^2 + 10x + 3$

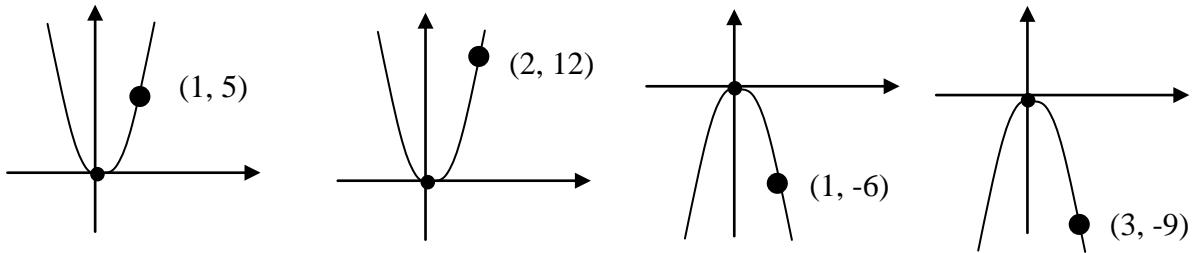
b) $y = x^2 - 16x + 8$

c) $y = x^2 + 4x - 9$

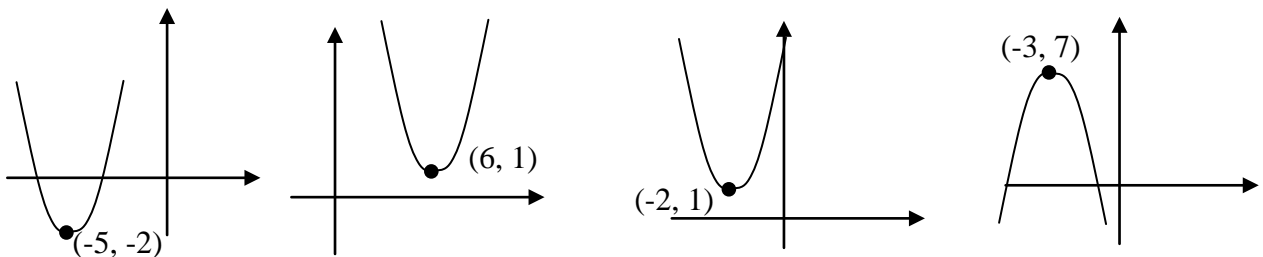
d) $y = x^2 - 12x - 7$

Quadratic Equations and Graphs

13. The graphs below are all of the form $y = kx^2$. Find the equation of each graph:



14. For each graph below, state the equation, giving your answer in the form $y = (x - a)^2 + b$.
Now find the a) the equation of the line of symmetry
b) the value of the y intercept.



15. State a) the equation of the line of symmetry
b) the coordinates and nature of the turning points of the parabolae with equations:

a) $y = (x - 3)^2 + 8$ b) $y = (x + 4)^2 - 2$ c) $y = 8 - (x - 5)^2$ d) $y = 10 - (x + 7)^2$

16. For each equation below, find:
a) the y-intercept
b) the roots
c) the turning point and hence make a clearly labelled sketch of each graph.

a) $y = (x + 6)(x - 2)$ b) $y = (x - 1)(x - 5)$ c) $y = x^2 + 12x + 20$

17. Using the quadratic formula, find the solutions to these equations:

a) $x^2 + 6x + 2$ b) $2x^2 - 3x - 7$ c) $3x^2 + 8x - 2$

18. By finding the value of the discriminant, state the nature of the roots of these equations:

a) $x^2 + 8x + 3$ b) $x^2 + 2x + 9$ c) $x^2 - 6x + 9$

d) $3x^2 - 6x - 2$ e) $x^2 + 12x + 36$ f) $x^2 - 7x + 2$

Answers

1. a) $\frac{53}{42} = 1\frac{11}{42}$ b) $7\frac{67}{72}$ c) $\frac{5}{33}$ d) $2\frac{47}{72}$ e) $\frac{5}{8}$ f) $3\frac{7}{9}$
- g) $1\frac{1}{5}$ h) $\frac{49}{12} = 4\frac{1}{12}$
2. Perimeter = $18\frac{26}{20} = 19\frac{3}{10}m$ Area = $20\frac{4}{5}m^2$
3. a) $\frac{1}{4b}$ b) $\frac{x+1}{x+2}$ c) $\frac{(a+b)^2}{(a-b)}$ d) $\frac{2(x+3)}{5(2x-7)}$
4. a) $(x+3)(x-3)$ b) $(x-5)(x+3)$ c) $\frac{(x-3)}{(x+5)}$
5. a) $\frac{am+bh}{hm}$ b) $\frac{rp-3k}{kp}$ c) $\frac{8x+11}{(x+2)(x+1)}$ d) $\frac{5x+30}{x(x-6)}$
- e) $\frac{3k}{gh}$ f) $3(w+1)$ g) $\frac{pd}{5k}$ h) $\frac{2}{3h(d-5)^2}$
6. a) SF = $\frac{2}{3}$ x = 16 cm b) SF = $\frac{5}{3}$ x = 23.3 cm
- c) SF = $\frac{5}{18}$ x = 12.5 cm d) SF = $\frac{5}{2}$ y = 12.5 cm x = 7.5 cm
7. SF = 1.25 ASF = $1.25^2 = 1.5625$ New Area = 18.4 cm^2
8. SF = $\frac{3}{4}$ ASF = $\frac{9}{16}$ New Area = 13.5 cm^2
9. SF = $\frac{3}{2}$ VSF = $\frac{27}{8}$ New Vol = 162 cm^3
10. SF = $\frac{1}{2}$ VSF = $\frac{1}{8}$ New Vol = 562.5 cm^3
11. a) $y = (x+5)^2 - 22$ b) $y = (x-8)^2 - 56$
- c) $y = (x+2)^2 - 13$ d) $y = (x-6)^2 - 43$
12. a) $y = 5x^2$ b) $y = 3x^2$ c) $y = -6x^2$ d) $y = -x^2$

13. a) $y = (x+5)^2 - 2$ LOS $x = -5$ y intercept (0, 23)
 b) $y = (x-6)^2 + 1$ LOS $x = 6$ y intercept (0, 37)
 c) $y = (x+2)^2 + 1$ LOS $x = -2$ y intercept (0, 5)
 d) $y = 7 - (x+3)^2$ LOS $x = -3$ y intercept (0, -2)
14. a) LOS $x = 3$ Min turning point (3, 8) b) LOS $x = -4$ Min turning point (-4, -2)
 c) LOS $x = 5$ Max turning point (5, 8) d) LOS $x = -3$ Min turning point (0, -2)
15. a) y intercept (0, -12) Roots $x = -6, 2$
 LOS $x = -2$ TP (-2, -16)
- b) y intercept (0, 5) Roots $x = 1, 5$
 LOS $x = 3$ TP (3, -4)
- c) y intercept (0, 20) Roots $x = -10, -2$
 LOS $x = -6$ TP (-6, -16)
16. a) -0.35, -5.65 b) 4.27, 0.23 c) 0.23, -2.9
17. a) $b^2 - 4ac = 42$ Two real and distinct roots
 b) $b^2 - 4ac = -32$ No real roots
 c) $b^2 - 4ac = 0$ Equal roots
 d) $b^2 - 4ac = 60$ Two real and distinct roots
 e) $b^2 - 4ac = 0$ Equal roots
 f) $b^2 - 4ac = 41$ Two real and distinct roots