

# Week 1

## 1. Expand and Simplify

a.  $3(x + 4) + 5(2x - 3)$   
 $3x + 12 + 10x - 15$   
 $13x - 3$

b.  $4(x - 1) - 3(x + 2)$   
 $4x - 4 - 3x - 6$   
 $x - 10$

## 2. Expand and Simplify

a.  $(x - 5)(x - 6)$   
 $x^2 - 6x - 6x + 30$   
 $x^2 - 11x + 30$

b.  $(2x - 3)(x + 5)$   
 $2x^2 + 10x - 3x - 15$   
 $2x^2 + 7x - 15$

## 3. Factorise

a.  $x^2 - 3x - 18$   
 $(x + 6)(x - 3)$

c.  $2x^2 + 13x + 6$   
 $(2x + 1)(x + 6)$

b.  $x^2 + 8x$   
 $x(x + 8)$

d.  $x^2 - 16$   
 $(x + 4)(x - 4)$

## 4. Solve

a.  $3x + 9 > 12$   
 $-9$   
 $3x > 3$   
 $x > 1$

b.  $4x + 3 = 2x + 14$

$2x = 11$       $x = 5.5$

## 5. Simplify

a.  $x^7 \div x^3$   
 $x^4$

b.  $4s^2t \times 3s^5t^3$

$12s^7t^4$

c.  $(y^5)^3$

$y^5 \times y^5 \times y^5 = y^{15}$

## 6. Nth Term

a. Find the Nth Term of

3     8     13     18  
 $5n - 2$

b. Is 598 in the sequence?

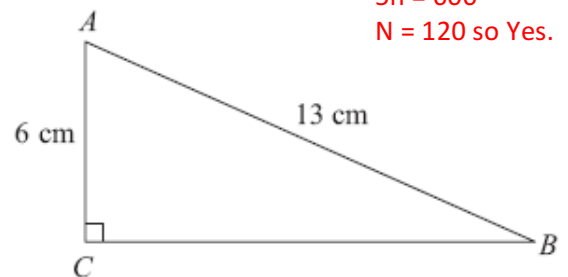
$5n - 2 = 598$   
 $5n = 600$   
 $n = 120$  so Yes.

## 7. Pythagoras

Work out the length of  $BC$ .

Give your answer correct to 3 significant figures.

$13^2 - 6^2 = 133$       $\sqrt{133} = 11.5\text{cm}$



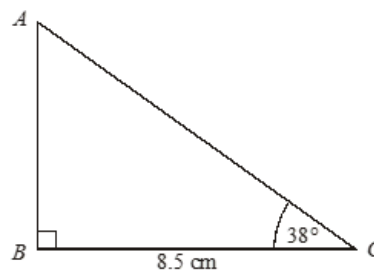
..... cm

## 8. Trigonometry

Work out the length of  $AB$ .

Give your answer correct to 3 significant figures.

$\text{Tan}(38) \times 8.5 = 6.64\text{cm}$



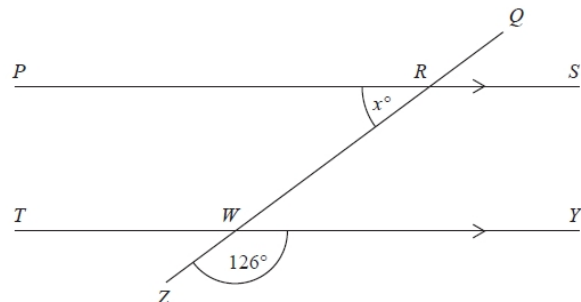
### 9. Speed

A sprinter runs a distance of 200 metres in 25 seconds.  
Work out the average speed of the sprinter.

$$S = \frac{d}{t} = \frac{200}{25} = 8\text{m/s}$$

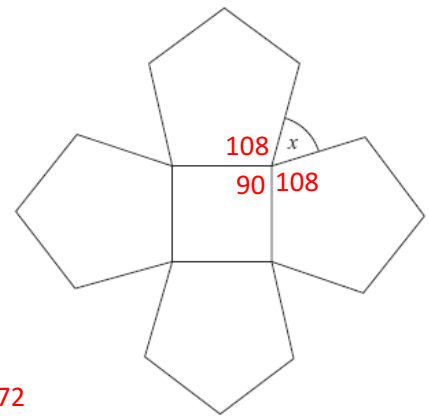
### 10. Angle Facts.

Find x. Give all reasons.



YWR = 54 Angles on a straight line add up to 180

X = 54 because alternate angles are equal.



.....m/s

$$360 \div 5 = 72$$

$$180 - 72 = 108$$

$$108 + 108 + 90 = 306$$

$$360 - 306 = 54$$

### 11. Ratio

a. Share £60 in the ratio 3:2.

$$60/5 = 12 \quad 3 \times 12: 2 \times 12 \quad 36:24$$

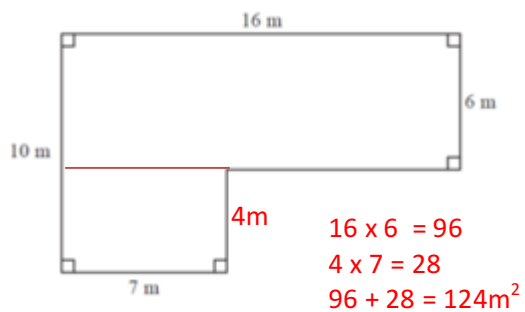
b. The ratio of the number of boys to the number of girls in a class is 2:3.

There are 24 girls in the class. 3 parts = 24

How many boys are there? 1 part = 8    2 parts boys = 16

### 12. Area

Calculate the area.

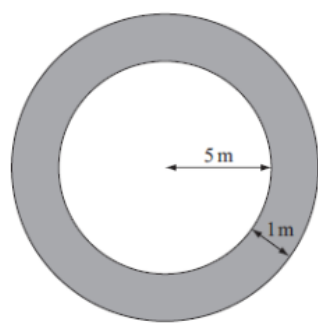


$$16 \times 6 = 96$$

$$4 \times 7 = 28$$

$$96 + 28 = 124\text{m}^2$$

$$\pi \times 6^2 - \pi \times 5^2 = 34.6\text{m}^2$$



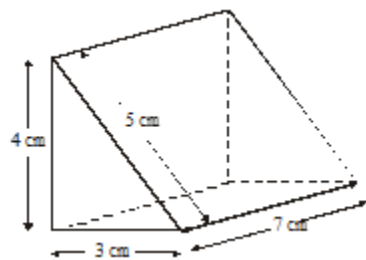
### 13. Volume.

Calculate the volume of this triangular prism.

$$\text{Vol} = \text{area of Front face} \times \text{length}$$

$$\text{Area} = (4 \times 3) / 2 = 6$$

$$\text{Vol} = 6 \times 7 = 42\text{cm}^2$$



### 14. Error Intervals

x = 7. x has been rounded to the nearest integer.

Write the **error interval** for x.     $6.5 < x < 7.5$

### 15. Solve these Simultaneous Equations

$$5x + 3y = 18$$

$$2x + y = 7 \quad \times 3$$

$$6x + 3y = 21$$

$$\underline{5x + 3y = 18 -}$$

$$x = 3$$

Sub it in:

$$2x + y = 7$$

$$6 + y = 7$$

$$y = 1$$

### 16. Forming and Solving Equations

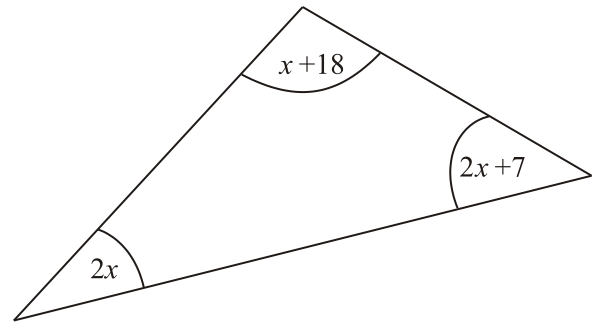
Find x.

$$2x + x + 18 + 2x + 7 = 180$$

$$5x + 25 = 180$$

$$5x = 155$$

$$x = 31$$



### 17. Tree Diagrams

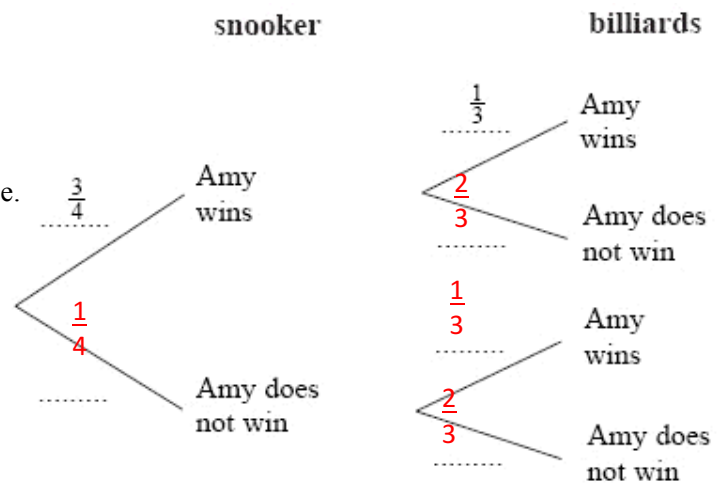
a. Complete the tree diagram

b. Find the Probability that Amy wins one game.

$$\frac{3}{4}x \frac{2}{3} + \frac{1}{4}x \frac{1}{3}$$

$$\frac{6}{12}x \frac{2}{3} + \frac{1}{12}x \frac{1}{3}$$

$$\frac{12}{12}x \frac{2}{3} + \frac{1}{12}x \frac{1}{3}$$



### 18. Compound Percentages

I invest £600 for 2 years at 5% compound interest. How much will I have in my account after 2 years.

$$600 \times 1.05^2 = \text{£}661.50$$

### 19. Direct and Inverse Proportion

y is directly proportional to the x.

When x = 5, y = 25.

Find y when x = 3.

$$Y = kx$$

$$25 = kx$$

$$K = 5 \quad y = 5x$$

$$Y = 5 \times 3 = 15$$

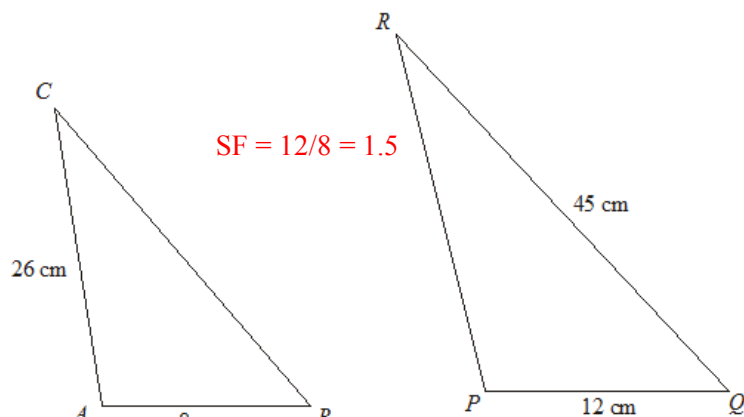
### 20. Similar Shapes

These are two similar triangles.

a) Calculate length RP.

$$26 \times 1.5 = 39$$

b) Calculate length CB,





## 21. Multiplying Decimals

Calculate  $1.23 \times 2.7$

Grid 3.321

## 22. Fractions. Calculate

a.  $\frac{3}{4} + \frac{1}{5}$

$$\frac{15}{20} + \frac{4}{20} = \frac{19}{20}$$

b.  $\frac{3}{4} \times \frac{1}{5}$

$$\frac{3 \times 1}{4 \times 5} = \frac{3}{20}$$

c.  $2\frac{3}{4} + 1\frac{1}{5}$

$$\frac{11}{4} + \frac{6}{5} = \frac{55}{20} + \frac{24}{20} = \frac{79}{20} = 3\frac{19}{20}$$

d.  $1\frac{3}{4} \div \frac{4}{5}$

$$\frac{7}{4} \div \frac{4}{5} = \frac{7}{4} \times \frac{5}{4} = \frac{7 \times 5}{4 \times 4} = \frac{35}{16} = 2\frac{3}{16}$$

## 23. Estimate

$$\frac{5.79 \times 312}{0.523}$$

$$\frac{6 \times 300}{0.5} = \frac{1800}{0.5} = 3600$$

## 24. Powers

a.  $3^{-2}$

$$\frac{1}{3^2} = \frac{1}{9}$$

b.  $36^{\frac{1}{2}}$

$$\sqrt{36} = 6$$

c.  $\left(\frac{4}{9}\right)^{-2}$

$$\left(\frac{9}{4}\right)^2 = \frac{81}{16}$$

## 25. Standard Form

a. Write  $4.5 \times 10^4$  as an ordinary number

$$45000$$

b. Write 0.047 in standard form

$$4.7 \times 10^{-2}$$

c. Calculate  $(4.4 \times 10^3) + (3.2 \times 10^2)$

$$4400 + 320 = 4720 = 4.72 \times 10^3$$

d.  $(4 \times 10^5) \div (2 \times 10^3)$

$$2 \times 10^2$$

## 26. Surds

Simplify:

a.  $\sqrt{48}$

$$\frac{\sqrt{16 \times 3}}{4\sqrt{3}}$$

b.  $(3 + \sqrt{2})(4 - \sqrt{2})$

$$12 - 3\sqrt{2} + 4\sqrt{2} - 2 = 10 + \sqrt{2}$$

c.  $\frac{3}{\sqrt{2}}$

$$\frac{3}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$$

## 27. Recurring Decimals

Convert  $0.\dot{7}$  to a fraction in its simplest form.

$$x = 0.\dot{7} \\ 10x = 7.\dot{7}$$

$$10x = 7.\dot{7} \\ x = 0.\dot{7} -$$

$$x = \frac{7}{9}$$