

## Week 4

### 1. Expand and Simplify

a.  $2(3x - 5) + 4(x + 3)$

$$6x + 10 + 4x + 12 \\ = \underline{10x + 22}$$

b.  $3(2x - 3) - 4(x - 3)$

$$6x - 9 - 4x + 12 = \underline{2x}$$

### 2. Expand and Simplify

a.  $(x + 6)(x - 2)$

$$x^2 + 6x + 2x + 12 \\ x^2 + 8x + 12$$

b.  $(3x - 5)(2x - 4)$

$$6x^2 - 10x - 12x + 20 \\ 6x^2 - 22x + 20$$

### 3. Factorise

a.  $x^2 - 3x - 18$

$$(x+3)(x-6)$$

c.  $5x^2 - 4x - 12$

$$(5x + 6)(x - 2)$$

b.  $ab + 5b$

$$b(a+5)$$

d.  $4x^2 - 100$

$$4(x + 5)(x - 5)$$

### 4. Solve

a.  $2x + 3 \geq 4$

$$2x \geq 1 \\ x \geq 0.5$$

b.  $4x + 10 = 4 - x$

$$5x = -6 \\ x = -6/5 = -1.2$$

### 5. Simplify

a.  $8x^5 \div 4x^2$

$$2x^3$$

c.  $(y^4)^3$

b.  $t^2 \times t^2 \times t^2$

$$t^6$$

$$y^{12}$$

### 6. Nth Term

a. Find the Nth Term of

$$4 \quad 7 \quad 10 \quad 13$$

$$3n + 1$$

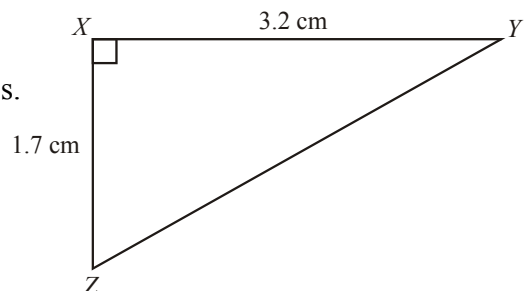
Is 301 in the sequence?  $3n + 1 = 301$  so  $n = 100$  so it is in sequence

### 7. Pythagoras

Work out the length of YZ.

Give your answer correct to 3 significant figures.

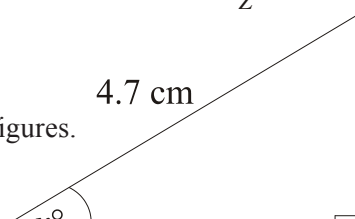
$$3.2^2 + 1.7^2 = 13.13 \quad \sqrt{13.13} = 3.62m$$



### 8. Trigonometry

Work out the length x.

Give your answer correct to 3 significant figures.



$$X = \cos^{-1}(3.9/4.7) = 33.9$$

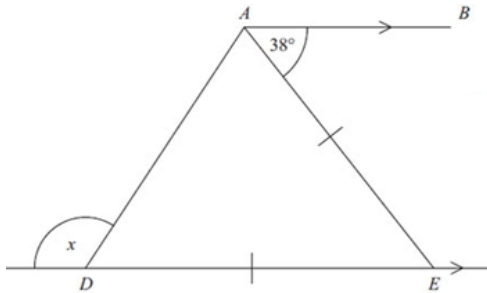
### 9. Speed

Daniel leaves his house at 07 00.  
 He drives 87 miles to work.  
 He drives at an average speed of 36 miles per hour.  
 At what time does Daniel arrive at work?

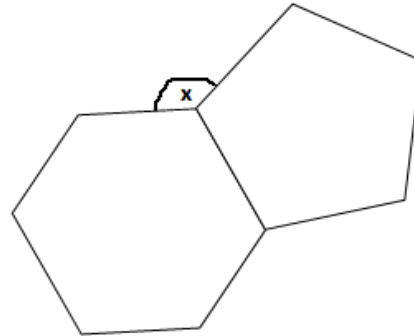
$$T = D/S = 87/36 = 2.416\dots \text{hr} = 2\text{h}25\text{min} \text{ so arrives at } 0925$$

### 10. Angle Facts.

Find  $x$ . Give all reasons.



$AED = 38$  (Alternate angles)  
 $ADE = 71$  (Isosceles triangle)  
 $X = 109$  (Straight line)



Exterior pentagon = 72  
 Exterior hexagon = 60  
 so  $x = 132$

### 11. Ratio

- a. David and Michael share £200 in the ratio 5:3.  
 How much do they each get?

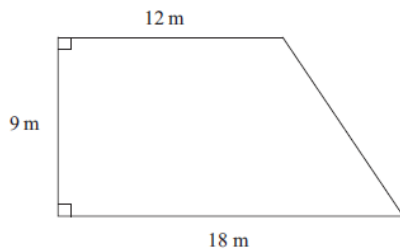
$$5 + 3 = 8 \quad 200/8 = 25 \quad D = 5 \times 25 = \text{£}125 \quad M = 3 \times 25 = \text{£}75$$

- b. The ratio of the number of boys to the number of girls in a school is 4:7.  
 There are 30 more girls than boys.  
 Work out how many boys there are.

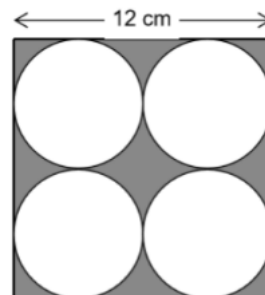
$$3 \text{ more parts represents } 30 \text{ so } 1 \text{ part} = 10 \text{ people} \quad \text{Boys} = 4 \times 10 = 40$$

### 12. Area

Calculate the area.



$$A = \frac{12 + 18}{2} \times 9 = 135\text{cm}^2$$



$$\begin{aligned} \text{Area circle} &= \pi \times 3^2 = 9\pi \\ \text{Shaded} &= 144 - 4 \times 9\pi \\ &= 144 - 36\pi \end{aligned}$$

### 13. Surface Area.

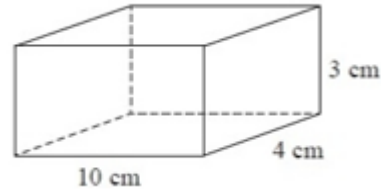
Calculate the surface area of this cuboid.

$$2 \times 10 \times 3 +$$

$$2 \times 10 \times 4 +$$

$$2 \times 4 \times 3$$

$$\underline{164\text{cm}^2}$$



### 14. Error Intervals

$x = 4700$ .  $x$  has been rounded to the nearest 2 significant figures.

Write the **error interval** for  $x$ .

$$4650 \leq x < 4750$$

### 15. Solve these Simultaneous Equations

$$3x + 3y = 12$$

$$4x - 2y = 10$$

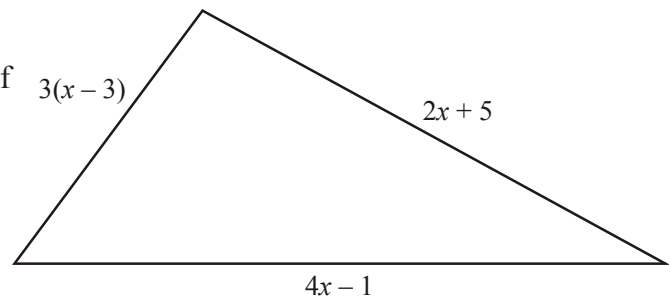
$$6x + 6y = 24$$

$$12x - 6y = 30 \quad (+)$$

$$18x = 54 \text{ so } x = 3$$

sub in  $9 + 3y = 12$  so  $3y = 3$  so  $y = 1$

16. Find the value of  $x$ . The perimeter of the triangle is 49.



$$3(x-3) + 2x + 5 + 4x - 1 = 49$$

$$9x - 5 = 49$$

$$9x = 54$$

$$x = 6$$

### 17. Tree Diagrams

There are 11 buttons in a bag.

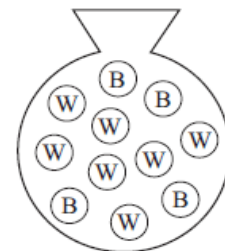
7 buttons are white.

4 buttons are black.

Harley takes a button at random from the bag, and **keeps it**.

She now takes another button at random from the bag.

Work out the probability that Harley takes a button of each colour.



White/blue OR blue/white

$$7/11 \times 4/10 + 4/11 \times 7/10$$

$$= 56/110$$

### 18. Compound Interest and Depreciation

The value of a car costing £8000 depreciates at 7% per year. What will the value of the car be after 5 years?  $8000 \times 0.93^5 = \underline{\underline{£5565.51}}$

## 19. Direct and Inverse Proportion

y is inversely proportional to x.  $y = k/x$

When  $x = 6$ ,  $y = 12$ .  $12 = k/6$  so  $k = 72$

Find x when  $y = 56$ .  $Y = 72/x$

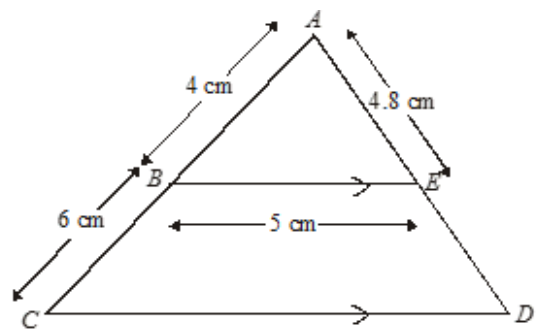
$$56 = 72/x \text{ so } x = 72/56 = 9/7$$

## 20. Similar Shapes S.F. = $10/4 = 2.5$

a) Calculate length CD.  $5 \times 2.5 = 12.5\text{cm}$

b) Calculate length ED.  $AD = 4.8 \times 2.5 = 12\text{cm}$

So ED = 7.2cm



## 21. Multiplying Decimals

Calculate  $1.37 \times 0.8$

1.096

## 22. Fractions. Calculate

a.  $\frac{4}{5} - \frac{1}{2}$

b.  $\frac{3}{7} \div \frac{3}{4}$

c.  $3\frac{2}{7} + 1\frac{1}{3}$

d.  $2\frac{3}{4} \times \frac{2}{3}$

a.  $\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$     b.  $\frac{3}{7} \times \frac{4}{3} = \frac{12}{21}$     c.  $\frac{23}{7} + \frac{4}{3} = \frac{69}{21} + \frac{28}{21} = \frac{97}{21} = 4\frac{13}{21}$     d.  $\frac{11}{4} \times \frac{2}{3} = \frac{22}{12} = 1\frac{5}{6}$

## 23. Estimate

$$\frac{23 \times 0.48}{2.1} = \frac{20 \times 0.5}{2} = 5$$

## 24. Powers

a.  $7^0$

1

b.  $16^{-\frac{1}{2}}$

0.25

c.  $\left(\frac{16}{25}\right)^{\frac{1}{2}}$

4/5

## 25. Standard Form

a. Write  $9.2 \times 10^{-3}$  as an ordinary number

0.0092

b. Write 5040000 in standard form

$5.04 \times 10^6$

c. Calculate  $(8.7 \times 10^4) - (4.2 \times 10^3)$

$87000 - 4200 = 82800 = 8.28 \times 10^4$

d.  $(8 \times 10^5) \div (4 \times 10^{-3})$

$2 \times 10^8$

**26. Surds**

Simplify:

a.  $\sqrt{48} + \sqrt{12}$

$$6\sqrt{3}$$

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

$$8 - 3 - 2\sqrt{3} + 4\sqrt{3}$$

$$5 + 2\sqrt{3}$$

c.  $\frac{5}{2\sqrt{3}}$   
 $\frac{5\sqrt{3}}{6}$

**27. Recurring Decimals**Convert  $0.\dot{2}\dot{5}$  to a fraction in its simplest form.

$$100x = 25.25252525\dots$$

$$\underline{x = 0.25252525\dots}$$

$$99x = 25$$

$$x = 25/99$$