

# Week 3

## 1. Expand and Simplify

a.  $2(3x - 2) + 4(x - 1)$   
 $6x - 4 + 4x - 4$   
 $10x - 8$

b.  $4(2x + 3) - 3(x - 5)$   
 $8x + 12 - 3x + 15$   
 $5x + 27$

## 2. Expand and Simplify

a.  $(x + 5)(x + 1)$   
 $x^2 + 1x + 5x + 5$   
 $x^2 + 6x + 5$

b.  $(3x + 1)(2x - 5)$   
 $6x^2 + 15x + 2x + 5$   
 $6x^2 + 17x + 5$

## 3. Factorise

a.  $x^2 + 2x - 15$   
 $(x + 5)(x - 3)$

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

b.  $8y + 4x$   
 $4(2y + x)$

d.  $x^2 - y^2$   
 $(x + y)(x - y)$

## 4. Solve

a.  $4x - 5 < 5$   
 $+5 \quad +5$   
 $4x < 10$   
 $x < 2.5$

b.  $x - 3 = 3x + 8$   
 $-x \quad -x$   
 $-3 = 2x + 8$   
 $-8 \quad -8$   
 $-11 = 2x \quad x = -5.5$

## 5. Simplify

a.  $y^6 \div y^2 = y^4$

b.  $4s^5t \times st^4 = 4s^6t^5$

c.  $(y^6)^2$   
 $y^6 \times y^6 = y^{12}$

## 6. Nth Term

a. Find the Nth Term of

2      8      14      20  
 $6n - 4$

b. Is 596 in the sequence?

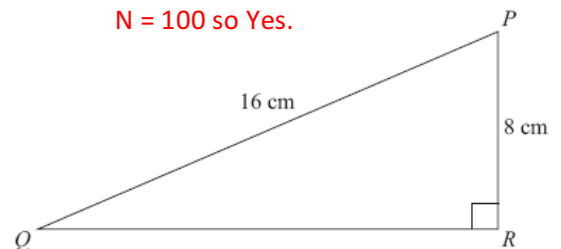
$6n - 4 = 596$   
 $6n = 600$   
 $N = 100$  so Yes.

## 7. Pythagoras

Work out the length of QR.

Give your answer correct to 3 significant figures.

$16^2 - 8^2 = 192 \quad \sqrt{192} = 13.9\text{cm}$

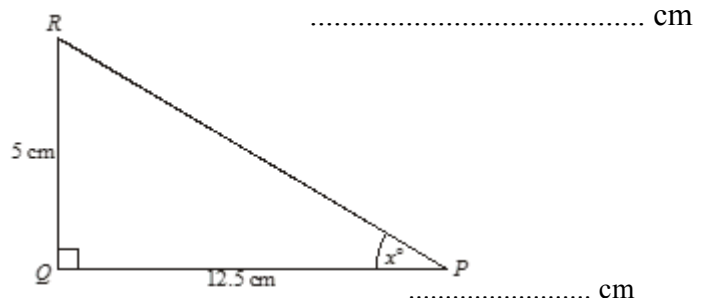


## 8. Trigonometry

Work out the length x.

Give your answer correct to 3 significant figures.

$\tan^{-1}(5 \div 12.5) = 21.8$



### 9. Speed

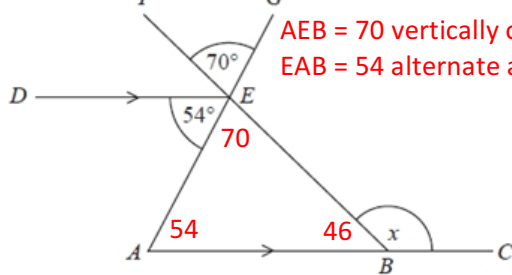
A car travels for 3 hours.  
Its average speed is 75 km/h.  
Work out the total distance the car travels.

$$S = \frac{d}{t} \quad d = s \times t = 75 \times 3 = 225 \text{ km}$$

.....km

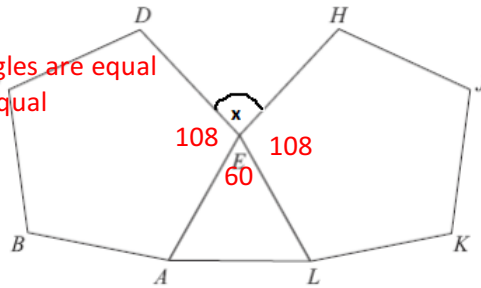
### 10. Angle Facts.

Find x. Give all reasons.



$AEB = 70$  vertically opposite angles are equal  
 $EAB = 54$  alternate angles are equal

$ABE = 46$  angles in a triangle add up to 180  
 $X = 134$  angles on a straight line add up to 180



$$\begin{aligned} 360/5 &= 72 \\ 180 - 72 &= 108 \\ 108 + 108 + 60 &= 276 \\ 360 - 276 &= 84 \end{aligned}$$

### 11. Ratio

- a. David and Michael share £300 in the ratio 5:1.  
How much does David get?

$$\begin{aligned} 5 + 1 &= 6 \\ 300 \div 6 &= 50 \\ 5 \times 50 : 1 \times 50 & \\ 250 : 50 & \quad \text{David gets } \pounds 250 \end{aligned}$$

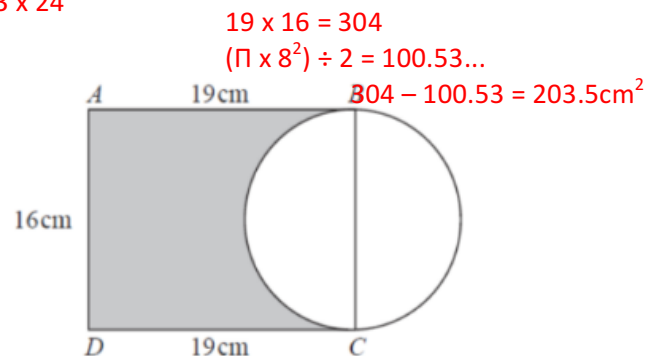
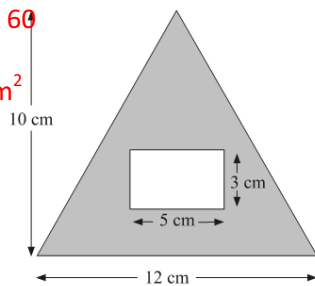
- b. The ratio of the number of boys to the number of girls in a school is 2:3.  
There are 120 children in total.  
How many boys and girls are there?

$$\begin{aligned} 2 + 3 &= 5 \\ 120 \div 5 &= 24 \\ 2 \times 24 : 3 \times 24 & \\ 48 : 72 & \end{aligned}$$

### 12. Area

Calculate the area.

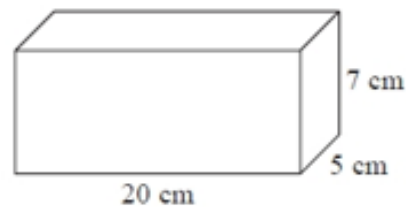
$$\begin{aligned} (12 \times 10) \div 2 &= 60 \\ 5 \times 3 &= 15 \\ 60 - 15 &= 45 \text{ cm}^2 \end{aligned}$$



### 13. Volume.

Calculate the volume of this cuboid.

$$\begin{aligned} \text{Vol} &= \text{area of Front face} \times \text{length} \\ \text{Area} &= 20 \times 7 = 140 \\ \text{Vol} &= 140 \times 5 = 700 \text{ cm}^3 \end{aligned}$$



### 14. Error Intervals

$x = 40$ .  $x$  has been rounded to the nearest one significant figure.  
Write the **error interval** for  $x$ .

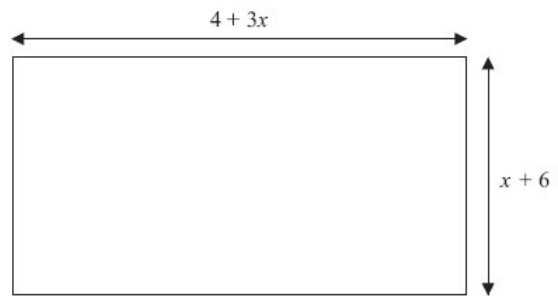
$$35 \leq x < 45$$

**15. Solve these Simultaneous Equations**

$$\begin{array}{ll}
 5x + 3y = 21 & \\
 4x - y = 10 \quad \times 3 & \text{Sub it in} \\
 12x - 3y = 30 & 5x + 3y = 21 \\
 \underline{5x + 3y = 21 +} & 15 + 3y = 21 \\
 17x = 51 & 3y = 6 \\
 X = 3 & Y = 2
 \end{array}$$

**16. Find the value of x.** The perimeter of this rectangle is 84.

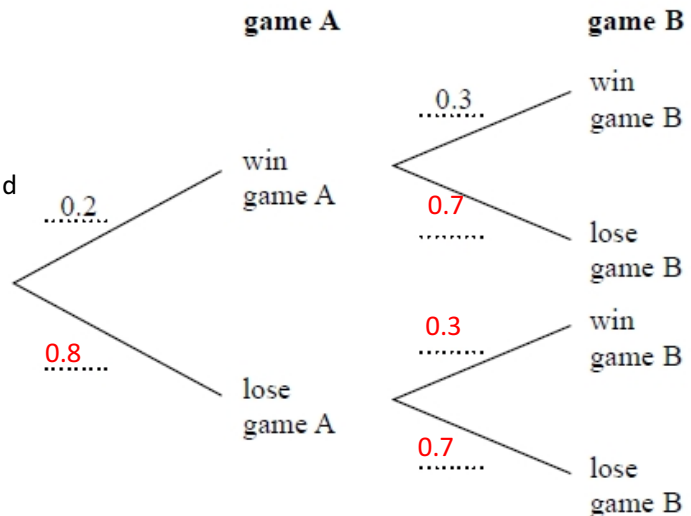
$$\begin{array}{l}
 X + 6 + x + 6 + 4 + 3x + 4 + 3x = 84 \\
 8x + 20 = 84 \\
 8x = 64 \\
 X = 8
 \end{array}$$



**17. Tree Diagrams**

- a. Complete the tree diagram
- b. Find the probability that they win one and Lose one game.

$$\begin{array}{l}
 0.2 \times 0.7 = 0.14 \\
 0.8 \times 0.3 = 0.24 \\
 0.14 + 0.24 = 0.38
 \end{array}$$



**18. Compound Interest and Depreciation**

I invest £800 for 3 years at 2.5% compound interest. How much will I have in my account after 3 years.

$$800 \times 1.025^3 = \text{£}861.25$$

**19. Direct and Inverse Proportion**

y is inversely proportional to x.

When x = 7, y = 4.

Find y when x = 56

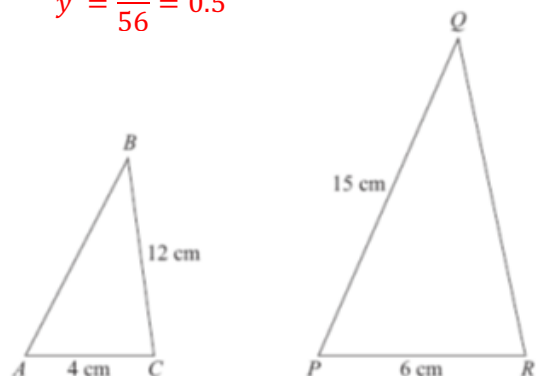
$$\begin{array}{l}
 y = \frac{k}{x} \\
 4 = \frac{k}{7} \\
 K = 4 \times 7 = 28 \\
 y = \frac{28}{x} \\
 y = \frac{28}{56} = 0.5
 \end{array}$$

**20. Similar Shapes**

These are two similar triangles.

- a) Calculate length RQ.
- b) Calculate length AB,

$$\begin{array}{l}
 6 \div 4 = 1.5 \\
 12 \times 1.5 = 18\text{cm} \\
 15 \div 1.5 = 10\text{cm}
 \end{array}$$





## 21. Multiplying Decimals

Calculate  $2.07 \times 1.2$

2.484

## 22. Fractions. Calculate

a.  $\frac{5}{6} - \frac{3}{4}$

$$\frac{10}{12} - \frac{9}{12} = \frac{1}{12}$$

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

$$\frac{2 \times 3}{3 \times 4} = \frac{6}{12} = \frac{1}{2}$$

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

$$\frac{7}{4} + \frac{8}{5} = \frac{35}{20} + \frac{32}{20} = \frac{67}{20} = 3\frac{7}{20}$$

d.  $1\frac{2}{3} \div 1\frac{4}{5}$

$$\frac{5}{3} \div \frac{9}{5} = \frac{5}{3} \times \frac{5}{9} = \frac{5 \times 5}{3 \times 9} = \frac{25}{27}$$

## 23. Estimate

$$3.2 \times 11.2$$

0.53

$$\frac{3 \times 10}{0.5} = \frac{30}{0.5} = 60$$

## 24. Powers

a.  $3^{-3}$

$$\frac{1}{3^3} = \frac{1}{27}$$

b.  $64^{\frac{1}{3}}$

$$\sqrt[3]{64} = 4$$

c.  $\left(\frac{4}{9}\right)^{\frac{1}{2}}$

$$\sqrt{\frac{4}{9}} = \frac{2}{3}$$

## 25. Standard Form

a. Write  $9.631 \times 10^{-4}$  as an ordinary number

0.0009631

b. Write 5400 in standard form

$5.4 \times 10^3$

c. Calculate  $(7 \times 10^4) - (3.4 \times 10^3)$

$$70000 - 3400 = 66600 = 6.66 \times 10^4$$

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

$$2 \times 10^2$$

## 26. Surds

Simplify:

a.  $\sqrt{24}$

$$\frac{\sqrt{4 \times 6}}{2\sqrt{6}}$$

b.  $(4 - \sqrt{5})(2 - \sqrt{5})$

$$8 - 4\sqrt{5} - 2\sqrt{5} + 5 = 13 - 6\sqrt{5}$$

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

$$\frac{6}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{6\sqrt{3}}{3} = 2\sqrt{3}$$

## 27. Recurring Decimals

Convert  $0.\dot{3}2\dot{5}$  to a fraction in its simplest form.

$$x = 0.\dot{3}2\dot{5}$$

...

$$1000x = 325.\dot{3}2\dot{5}$$

$$x = 0.\dot{3}2\dot{5} \quad \therefore \quad 1000x - x = \frac{325}{999}$$