S2 Mathematics Level F Course

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Mr. Lafferty	7/12/2010	S2 Level F NEED TO KNOW

Solving Equations (Balancing Method)

multiply EVERY term to get rid of fractional term.
and
Apply 'Balancing Method'

Multiply EVERY term by 3

$$\frac{x+1}{3}+4=6 \qquad (x+1)+12=18$$

Subtract 13 from each side

$$x+13=18$$

$$x=5$$

The Circle

Circumference is $C=\pi D$

Diameter $D=2r$

Radius $r=\frac{1}{2}D$

Area is $A=\pi r^2$

Area

$A=l^2$ $A=l\times b$

Revision of Square, Rectangle and RAT.

$A=\frac{1}{2}bh$

Any Type of Triangle

Rhombus and kite $A=\frac{1}{2}Dd$

Parallelogram $A=bh$

Trapezium $A=\frac{1}{2}(a+b)h$

Percentages

e.g. 17.5% of 300

10% ⇨ 300 ÷ 10 = £30
5% ⇨ 30 ÷ 2 = £15
2.5% ⇨ 15 ÷ 2 = £ 7.50
17.5 % £52.50

10% ⇨ ÷ 10
5% ⇨ half of 10%
1% ⇨ ÷ 100
0.5% ⇨ half of 1%
2% ⇨ twice 1%
3% ⇨ 3 times 1%

Without a calculator

Percentage out of 100

Finding Percentages

With a calculator

% profit or loss

e.g. 19% of £60

$\frac{19}{100}\times 60 = £11.40$

I buy a CD for £4 and sell it for £7. What is the percentage profit?

Profit made £3 $\frac{3}{4}\times 100 = 75\%$

Pythagoras Theorem

Two key points when dealing with right-angled triangles

The longest side in a right-angled triangle is called The HYPOTENUSE

The HYPOTENUSE is ALWAYS opposite the right angle

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

$(xz)^2 = (xy)^2 + (yz)^2$

Factorisation

Take any common factors out and put them outside the brackets.

$4xy - 2x = 2x(2y - 1)$

Proportion

Test for Direct
1. Straight line through the origin (0,0)
2. Ratio : $y \div x = k$ (constant number)

Multiply by 2 k=2

x	0	1	2	3
y	0	2	4	6

5 cakes cost £4 How much for 3 cakes?

cakes	cost
5	£4
1	£0.80
3	£2.40

÷5 ⇩ x 3

Direct proportion & Indirect Proportion

Test for indirect
1. $y \times x = k$ (constant number)

3 men build a wall in 8 hrs How long will 4 men take?

men	hours
3	8
1	24
4	6

÷3 ⇩ x4 ⇩ ÷4

x	1	2	4	8
y	8	4	2	1

$y \times x = 8$ k = 8

Fractions

Adding $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$

Multiplication $\frac{1}{2}\times\frac{3}{5}=\frac{3}{10}$

Subtracting $\frac{2}{3}-\frac{1}{2}=\frac{1}{6}$

Simple fractions

Division $\frac{1}{2}\div\frac{4}{5}$ Flip and change the sign $\frac{1}{2}\times\frac{5}{4}=\frac{5}{8}$

Basic Rules of Fraction

Harder fractions

Subtracting $2\frac{1}{2}-1\frac{1}{3}$ Deal with whole numbers first $1+\frac{1}{2}-\frac{1}{3}=1\frac{1}{6}$

Same idea for addition

Multiplication $1\frac{1}{2}\times 1\frac{1}{4}=\frac{3}{2}\times\frac{5}{4}=\frac{15}{8}=1\frac{7}{8}$ Top-heavy first

Division $1\frac{1}{2}\div 1\frac{2}{3}=\frac{3}{2}\div\frac{5}{3}$ Top-heavy first; Flip and change the sign $\frac{3}{2}\times\frac{3}{5}=\frac{9}{10}$

Scientific Notation

Why is this not scientific notation ?

4000 Write out in full 4×10^3

11×10^{18} a not between 1 and 10

1.1×10^{19}

$a\times10^n$ a between 1 and 10, n is positive

Science

Scientific Notation = Standard Form

LARGE numbers

Maths

SMALL numbers

$a\times10^n$ a between 1 and 10, n is negative

0.0000006 Write out in full 6×10^{-7}

0.5×10^{-5}

5×10^{-6}

Why is this not scientific notation ?

a is less than 1 $a < 1$

Linear Patterns

Number of Tables	1	2	3	4	5
Number of Surfers	5	7	9	11	13

2 2 2 2

Step 1 : Find difference — Same difference linear pattern

Step 2 : Part of the Formula $S = 2T$ — Find a number so formula works

Step 3 : Correction factor "add on 2" $S = 2T + 3$

Charts

Scattergraph

Strong positive correlation

Best fit line

Strong negative correlation

stem	leaves
2	4 6 8
3	0 1 3
4	4 4 5 6 7 9
5	0 3 4 9
6	1 4 5 6

Ages

n = 20 Key : 2 | 4 means 24

Chocolate 84° Banana 66° Vanilla 39° Strawberry 171°

Speed time Distance

$D = S \times T$

$S = \frac{D}{T}$ $T = \frac{D}{S}$

Simple way to remember the 3 formulae !

To change minutes to decimal hours 'divide minutes by 60'

To change decimal time to minutes 'multiply the decimal part by 60'

Scale Drawings

Scale Drawings

T, X, Y, 55°, 6m

Solution Using a scale of 1cm = 2m

Step 1: Draw line XY=3cm
Step 2: Draw a line straight up from Y.
Step 3: Measure angle 55° from X.
Step 4: Draw line from X to vertical line and mark T at crossover point.
Step 5: Measure length YT. 4.3cm
Step 6: Multiply length YT. by scale factor.

$4.3 \times 2 = 8.6$m

Flag pole is 8.6m high

Statistics

An average should indicate a "measure of central tendency" but should also indicate what the distribution of data looks like.

This is why we have 3 different types of averages to consider

1. The Mean
2. The Median (put the data in order then find the MIDDLE value)
3. The Mode (the number that appears the most)