**Part 2**

**PROMPT Sheet**

**8/1 Multiply & divide decimals**

**~Multiply** \* take out decimal point

\* multiply

\*put decimal point back in

e.g. 3.2 x 0.4

* 32 x 4 (remove decimal points)
* 128 (multiply)
* 1.28 (put decimal point back in-2 decimal places)

**~Divide** \* make divisor into a whole number

\* multiply both numbers

e.g. 2.84 ÷ 0.2 (multiply both numbers by 10)

* 28.4 ÷ 2
* 14.1

**~Inverses**

2.4 x 36 = 86.4

* 86.4 ÷ 36 = 2.4
* 86.4 ÷ 2.4 = 36

**8/2 Prime factorisation**

40

4 10

2 2 2 5

**40 = 2x2x2x5 = 23 x 5**

**Extend to find HCF & LCM**

Example: To find HCF & LCM of 40 and 36

40 = 2x2x2x5 = 23 x 5

36 = 2x2x3x3 = 22 x 32

Using a Venn diagram:

40

36

3

2

5

2

2

3

HCF = 2x2 = 22

LCM = 22 x 2 x 5 x 3 x 3 = 23 x 32 x 5

**8/3 Round to significant figures**

**~ ONE significant figure**

300 80 2

0.7 0.05 0.003

**~Estimate answers to calculations**

*Round each number to 1significant figure first*

e.g. 423 x 28 ≈ 400 x 30 = 12000 = 20

568 600 600

e.g. 3.26 x 11.8 ≈ 3 x 10 = 30 = 300 = 50

0. 58 0.6 0.6 6

e.g. 8.3 x 35.6 ≈ 8 x 40 = 320 = 640

0.49 0.5 0.5

***(÷0.5 = doubling***

***the number being divided)***

**8/4 Powers and roots**

42 – we say 4 squared or the square of 4

* It means 4x4 = 16

23 – we say 2 cubed or the cube of 2

* It means 2x2x2 = 8

34- we say 3 to the power of 4

* It means 3x3x3x3 = 81

The inverse operation for ‘power’ is ‘root’

= 4

x

**√**

 = 2

= 3

**8/5 Convert decimals to fractions & vv**

**~Decimals to fractions**

2 . 4 7 5 = =







**~Fractions to decimals** - by changing

e.g. = = 0.8

e.g. = = 0.75

**~Fractions to decimals** - by dividing

e.g. = 3÷8 = 0.375

**8/6 Factorise an expression**

This is the opposite of expand – put bracket back in

4y – 12 = 4(x – 3)

Expand the answers to check that they give the original expression

y2 + 7y = y(y + 7)

**8/7 Laws of indices**

When multiplying ADD the indices

When dividing SUBTRACT the indices

Treat numbers as normal

e.g. **3**a**2** x **2**a**3** = (**3** x **2**)a**2+3** = **6**a**5**

**10**a**6** ÷ **5**a**2** = (**10** ÷ **5**)a**6-2** = **2**a**4**

(3**4**)**2** = 34x 34 = 34+4 OR 3**4**x**2 = 38**

**Note: k2 x k2 xk2 = k6; k2 + k2 +k2 = 3k2**

**Zero and negative indices**

e.g. 30 = 1; 230 = 1; x0 = 1

e.g. 2-1 = ½ ; 2-2 = ; 2-3 =

**8/8 Change the subject of a formula**

* Use the same balancing steps as when you solve equations

Example: Make ‘t’ the new subject in:

v = u + at  *(-u from each side)*

v – u = at *(÷a each side)*

v – u = at

a a

t = v – u

a

**8/9 Substitute into expression/formula**

* Write down the expression/formula
* Substitute the numbers given
* Use BIDMAS

e.g. S = 2a2 + 2c when a = 3, c = 5

S = 2(3)2 + 2x(5)

S = 2x9 + 10

S = 28

**SUVAT formulae will be given**:

v = u+at

s=displacement; u=initial velocity

v=final velocity; a=acceleration; t=time

s = ut + ½ at2

v2 = u2 + 2as

Whenever you have a SUVAT question, identify the **three** things you know and the **one** thing you want to find out. Use the equation with these four things in.

* *If something is starting from rest then the initial velocity (u) is zero*
* *acceleration - gravity applies to all falling objects approximately 10m/s2*

**8/10 Solve equations-unknown both sides**

~Multiply out brackets first

~Letters on both sides? - get rid of the smaller first

~Solve by balancing in the usual way

e.g.

To solve: 5(x – 3) = 3x + 7 (expand bracket)

5x – 15 = 3x + 7(-3x from both sides)

2x – 15 = + 7 (+15 to each side)

2x = 22 (÷2 both sides)

2 2

x = 11

**8/11 Plot & interpret linear graphs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | -2 | -1 | 0 | 1 | 2 |
| y | -7 | -4 | -1 | 2 | 5 |

Example: y = 3x – 1

~Substitute values of x into the equation

~Plot the points in pencil

y

~Join the points with a ruler& pencil

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | 5 |  |  |  |
|  |  | 4 |  |  |  |
|  |  | 3 |  |  |  |
|  |  | 2 |  |  |  |
|  |  | 1 |  |  | x |
| -2 | -1 | 0 | 1 | 2 | 3 |
|  |  | -1 |  |  |  |
|  |  | -2 |  |  |  |
|  |  | -3 |  |  |  |
|  |  | -4 |  |  |  |
|  |  | -5 |  |  |  |
|  |  | -6 |  |  |  |
|  |  | -7 |  |  |  |

**8/12 Find gradients & intercepts of**

**linear graphs**

**~algebraically**

These are graphs that can be written in the form: y= **m**x + **c**

* m means gradient of the line
* c is where the graph cuts the y-axis

e.g. y = 3x – 1

Has a gradient of 3 and cuts the y-axis at -1

**8/12 (continued)**

**~graphically**

* The gradient of a line is its ‘slope’
* It is measured by vertical ÷ horizontal

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | 5 |  |  |  |
|  |  | 4 |  |  | Gradient = = 3 |
|  |  | 3 |  |  |  |
|  |  | 2 |  |  |  |
|  |  | 1 |  |  |  |
| -2 | -1 | 0 | 1 | 2 | 3  y-intercept = |
|  |  | -1 |  |  |  |
|  |  | -2 |  |  |  |
|  |  | -3 |  |  | Equation of straight line: y= **m**x + **c**  y= **3**x **-1** |
|  |  | -4 |  |  |  |
|  |  | -5 |  |  |  |
|  |  | -6 |  |  |  |
|  |  | -7 |  |  |  |

**Remember GRADIENT is a rate of change**

**8/13 Graphs in context-Distance/Time Graph**

1200 1300 1400 1500 1600 1700

**Time of day**

**A**

**B**

**C**

**D**

* AB shows the journey away
* BC shows no movement
* CD shows journey back
* The steeper the line the higher the speed

**8/14 Draw & interpret quadratic graphs**

~The quadratic graph is a **smooth** curved parabola passing through the plotted points

~The general form of a quadratic is **"*y* = *ax*2 + *bx*+ *c*"**

e.g. y= - x2

e.g. y= x2

**8/15 Sequences**

**~Find nth term from position to term rule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Position | 1  x**4**-1 | 2 | 3 | 4 |
| Term | 3 | 7 | 11 | 15 |

+4

Term to term rule = +**4**

Position to term rule is x **4** - 1

*(because position (T1 ) = 1 x 4 – 1 = 3)*

nth term (Tn) = n x 4 -1 = 4n – 1

(n is the position of the term)

**~Generate terms of a sequence from nth term**

If the nth term is 5n + 1

**1**st term T1 *(n=****1)*** = 5x**1** + 1 = 6

**2**nd term T2 *(n=****2****)* = 5x**2** + 1= 11

**3**rd term T3 *(n=****3****)* = 5x**3** + 1 = 16

**8/16 Expand two brackets**

* **Use F O I L**

**F O**

(x + 3)(x – 3)

**L**

**F O I L**

x2 – 3x + 3x – 9

**=**x2- 9

**F O**

**(x + 3)(x – 2)**

**I**

**I**

**L**

**F O I L**

x2 – 2x + 3x – 6

**=**x2+ x – 6

**8/17 Multiplicative relation from ratio**

**Example boys : girls is 5:3**

**Boys =**

**Girls =**

**8/18 Proportion as equality of ratios**

**~Map scale 1 : 10000**

* **1cm : 10000cm**
* **1cm : 100m**

**~Conversion 8km : 5miles**

* **1km : 1.6miles**

**~Mixing 3red : 2 white**

* **1.5 red : 1 white**

**8/19 Increase & decrease by a percentage**

* To increase a quantity by 5%

Multiply the quantity by 1.05 (100+5 = 105)

* To decrease a quantity by 5%

Multiply the quantity by 0.95 (100–5 = 95)

**8/20 Compound units**

* These triangles are useful
* Cover the quantity you are trying to find
* What is uncovered is the formula to use

D M

S T D V

D~Distance M~Mass

S~Speed (mph) D~Density (g/cm3)

T~Time V~Volume

**8/21 Angles of polygons**

~Polygons have straight sides

~Polygons are named by the number sides

3 sides – triangle

4 sides – quadrilateral

5 sides – pentagon

6 sides – hexagon

7 sides – heptagon

8 sides – octagon

9 sides – nonagon

10 sides - decagon

**With ALL sides equal they are called REGULAR**

**Sum of exterior angles is always 3600**

1080 720

~ the interior & exterior angle add up to 1800

~ the interior angles add up to:

Triangle = 1 x 1800 = 1800

Quadrilateral = 2 x 1800 = 3600

Pentagon = 3 x 1800 = 5400

Hexagon = 4 x 1800 = 7200 etc

**8/22 Circumference of circle - Learn**

C = π x d

= π x 8

= 25.1cm 8cm

**8/22 Area of circle - Learn**

A = π x r2

= π x r2

= π x 52  5cm

= 78.5cm2

**8/23 Volume of prism - Learn**

Volume of any prism=Area of cross-section x length

cross

section

length

**8/24 Enlargement**

* **Enlarge a shape by fraction scale factor**

You need to know:

* Centre e.g. ( 5, 4)
* Scale factor e.g. ½

****

Scale

factor ½

**The image is similar; all lengths are half the original**

**8/25 Scales and bearings**

**~Scales**

* A scale is represented by a ratio

**e.g. 1 : 50 000**

**which means**

**1cm : 50000cm(or 500 m or 0.5 km)**

**~Bearings**

* A bearing is a direction measured as an angle clockwise from the North
* It needs 3 digits so may need a 0 in front

e.g. 0720

* Bearings are given from a fixed point so look for the fixed point after the word ‘FROM’

e.g. A bearing of 0720 from A to B

B

**A**

**8/26 Probability**

If 2 outcomes cannot occur together, they are mutually exclusive

~ If 2 outcomes A and B are mutually exclusive

**P(A) + p(B) = 1**

~ If 3 outcomes A B and C are mutually exclusive

**P(A) + p(B) + p(C) = 1**

e.g. If outcomes A, B and C are mutually exclusive and

p(A) = 0.47

p(B) = 0.31

then

p(C) = 1 – (0.47 + 0.31)

= 1 – 0.78

= 0.22

**8/27 Frequency trees**

These are a means of representing & sorting data

**Example:** 80 children went on a school trip to Flamingo Land or Lightwater Valley

23 boys and 19 girls went to Flamingo Land

14 boys went to Lightwater Valley.

**Place Gender**

Flamingo

Lightwater

**Two-way tables**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Flamingo** | **Lightwater** | **Total** |
| **Boys** | **23** | **14** | **37** |
| **Girls** | **19** | **24** | **43** |
| **Total** | **42** | **38** | **80** |

**8/28 Sample space & probability**

**Outcomes can be presented:**

* **In a list**
* **In a table or sample space**

**Example of a sample space**

To show all possible outcomes from spinning a spinner and rolling a dice

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Dice | | | | | |
|  | + | **1** | **2** | **3** | **4** | **5** | **6** |
| Spinner | **1** | 2 | 3 | 4 | 5 | 6 | 7 |
| **2** | 3 |  |  |  |  |  |
| **3** | 4 |  |  |  |  |  |
| **4** | 5 |  |  |  |  |  |

**8/29 Estimate mean from grouped data**

|  |  |  |  |
| --- | --- | --- | --- |
| **Time (*t* sec)** | **x** | **f** | fx |
| 60 < *t* ≤ 70 | 65 | 12 | 780 |
| 70 < *t* ≤ 80 | 75 | 22 | 1650 |
| 80 < *t* ≤ 90 | 85 | 23 | 1955 |
| 90 < *t* ≤ 100 | 95 | 24 | 2280 |
| 100 < *t* ≤ 110 | 105 | 19 | 1995 |

**∑f=100 ∑fx=8660**

Est. Mean = ∑fx = 8660 = **86.6sec**

∑f 100

Modal class = **90 < *t* ≤ 100**

*(because this class interval has the largest frequency i.e. 24)*

Median = ½ (100 + 1) th = 50.5th

= **80 < *t* ≤ 90**

**8/30 Scatter graphs**

A scatter diagram would be used to find out if there is any correlation or relationship between two sets of data

**e.g. Positive Correlation**

Strong positive Weak positive

If the data shows correlation, draw in a line of best fit

Points which do not fit the trend are called OUTLIERS and should be ignored

The line can be used to predict data

Line of best fit

outlier

Negative Positive No correlation

Correlation does not always imply causation

**i.e. does not imply that one**[**causes**](https://en.wikipedia.org/wiki/Causality)**the other**

**Make predictions with line of best fit**

The line of best fit can be used to predict data

Line of best fit

[**Interpolation**](http://whatis.techtarget.com/definition/polynomial-interpolation)**from scatter diagrams**

This is a method of estimating values between **known**[**data points**](http://whatis.techtarget.com/definition/data-point)

**Extrapolation from scatter diagrams**

This is a method of estimating values **beyond/out of known**[**data points**](http://whatis.techtarget.com/definition/data-point)

* Extrapolation should be used with caution as it can give results that will not be observed in real life,
* Using a trend line calculated from a small number of samples and not a population is inaccurate
* We do not know whether the linear pattern progresses past the data we are given.