# St. Peter the Apostle High School

# **Mathematics Dept.**



# Practice Prelim One Paper 2

## **Duration: 1 Hr 30 Mins**

Marks: 50

- 1. Attempt ALL questions.
- 2. You <u>MAY</u> use a calculator.
- **3.** Write your solutions on the blank paper provided.
- 4. Full credit will be given only where the solution contains appropriate working.
- 5. Square-ruled paper will be provided if necessary.

### **Formula Sheet**

The roots of 
$$ax^2 + bx + c = 0$$
 are  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$ 

Sine rule:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine rule:

$$a^{2} = b^{2} + c^{2} - 2bc \cos A$$
 or  $\cos A = \frac{b}{c}$ 

$$=\frac{b^2+c^2-a^2}{2bc}$$

Area of a triangle: Area =  $\frac{1}{2}ab \sin C$ 

Volume of a sphere: Volume =  $\frac{4}{3}\pi r^3$ 

Volume of a cone: Volume =  $\frac{1}{3}\pi r^2 h$ 

Volume of a pyramid: Volume = 
$$\frac{1}{3}Ah$$

Standard deviation: 
$$s = \sqrt{\frac{\sum (x - \overline{x})^2}{n - 1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n - 1}}$$
, where n is the sample size.

- The Earth travels around the Sun at a speed of 3.0 x 10<sup>4</sup> metres per second. The journey takes 3.16 x 10<sup>7</sup> seconds. Calculate the distance the Earth travels for one complete rotation around the Sun. Give your answer in scientific notation.
- 2. Florence bought a car in 2014. She then sold it in 2017 for £9000, a 15% reduction in value from when she bought it. How much did Florence buy the car for in 2014?
- 3. A shop worker, Marjery, earns £24000 per annum.
  Due to the recession her employer has decided to decrease her wages by 3% this year but award her a 4% pay rise the following year.
  Did Marjery receive an overall pay rise or pay cut? Explain your answer fully.
- 4. Express  $x^2 + 10x + 17$  in the form  $(x + p)^2 + q$  2
- 5. Mr Speir gives his Advanced Higher students a test and records the marks as follows:

a)	Calculte the Mean and the Standard Deviation for this set of data.	4
b)	Last years results gave a mean of 28 and a stadard devation of 5.8	
	Write 2 statements to compare these results to last years.	2
c)	Calculate the Semi-Interquartile Range for this years data.	2

3

4

6. A glass bowl is designed to hold sweets. It is formed from a square based pyramid of height 8cm with a hemisphere of radius 4cm hollowed out of the base The square base of the pyramid has length 10cm Wooden legs are used to stabilise the bowl.



Calculate the volume of glass used to make the bowl, correct to 2 significant figures.

7. A mobile phone mast, 18.2 metres high, stands vertically in the centre of a concrete circle.

It is supported by a wire, 19 metres long, attached to the ground at a point on the circumference of the concrete circle as shown.

- a) Calculate the area of the concrete circle
- **b**) If the concrete is 40cm thick, what volume of concrete is needed to make the circle?

19 m

 Shampoo is available in travel size and salon size bottle. The bottles are mathematically similar.

The travel size contains 200ml and is 12cm in height.

The salon size contains 1600ml

Calculate the height of the salon bottle.





18·2 m

travel

salon

5



9. Find the equation of the line, passing through the points(0, 3) and (2, 7) as shown:



- **10.** Expand and simplify:  $(3x 2)(2x^2 + x + 5)$
- **11.** Solve: 5 7x < 3 5(x 2)
- 12. There are 3 harbours on Loch Stravaig as represented by *A*, *B* and *C*.

From *A*, the bearing of *B* is  $074^{\circ}$ From *C*, the bearing of *B* is  $310^{\circ}$ 

*B* is 23 miles from *A* and 11 miles from *C*.

- **a**) Calculate the size of angle *ABC*
- **b**) Calculate the distance from *A* to *C*.



Total Marks: 50

#### **End of question Paper**

3

3

