St. Peter the Apostle High School

Mathematics Dept.



Practice Prelim Four 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 value of an antique vase has been increasing at the rate of 5.6% per annum

If it was bought three years ago for £3660, what is its value now?

A formula used in Physics is: $F = \frac{mv^2}{r}$ 2.

for the last three years.

1.

Change the subject of the formula to *v*.

Solve the quadratic equation $3x^2 - 5x - 7 = 0$ giving your 3. answer(s) correct to 1 decimal place.

A <u>cube</u> of side 5 units is placed relative 4. to a set of rectangular axes as shown.

Point B has coordinates (-5,0,5).

- a) What are the coordinates of point *E*?
- **b**) Given that $\overrightarrow{OF} = \underline{u}$, $\overrightarrow{CE} = \underline{v}$ and $\overrightarrow{OD} = \underline{w}$, find \overrightarrow{BD} in terms of \underline{u} , v and \underline{w} .
- 5. A comet travels in a wide loop around our solar system.

At its closest point to the earth it is travelling at an average speed of 1.56×10^5 miles per hour.

At this speed how far, in miles, will it travel in a week?

Give your answer in scientific notation correct to 2 significant figures.



Marks

3

3

1

2

4

- A gym has 855 members which is an increase of 14% on last year. 6. How many members did it have last year?
- 7. Jenny recorded the rainfall, in mm, at her house for a period of 7 days The results are given below.
 - $2 \cdot 8$ 5.6 $2 \cdot 3$ 9.4 0 0.51.8
 - Calculate the mean rainfall. 1 a) **b**) Calculate the standard deviation correct to 1 decimal place. 3 c) Keith, who lives in another part of the country, did the same and found that the standard deviation was $2 \cdot 3$. Compare the results making particular reference to the spread of the rainfall. 1
- 8. Two watering cans are mathematically similar 4.5 litres The smaller one has a width of 18 cm and the larger one 18cm has a width of 27cm.

If the larger one has a capacity of 4.5 litres, calculate the capacity of the smaller one. Round your answer to 1 decimal place.

9. Triangle PQR has dimensions as shown.

Calculate the size of angle R.

3

28°

7 cm

27cm

3



0



3

- 11. The tables in Carlo's Coffee shop are circular with a segment removed so that they will fit against a wall. The diameter of the tables is 90 cm. A The width of AB is 70cm. Calculate the depth, d cm, of the tables. d cm 4 12. Allan was practising his golf target shots. The target was on a bearing 056° and at a distance of 90 metres from him. 90m Allan hit his shot a distance of 65 metres on a bearing of 067°. 65m How far from the target did his ball land? 3 13. A metal weight is shown opposite. h cm It consists of a hemispherical base with a cone on top and has a volume of 122.5 cm³ Given that the diameter of the hemisphere is 6cm calculate the height, h cm, of the cone. 6 cm 5
- 14. The lengths of the sides of a right angled triangle are 2a cm, (2a + 1) cm and (a 5) cm.



Calculate the value of *a*.

Total Marks: 50

End of question Paper

5

Marks