St. Peter the Apostle High School

Mathematics Dept.

N5 Practice Prelim One Paper 1

Duration: 1 Hour **Marks: 40**

1. Attempt ALL questions.
2. You **MAY NOT** 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 $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

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

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

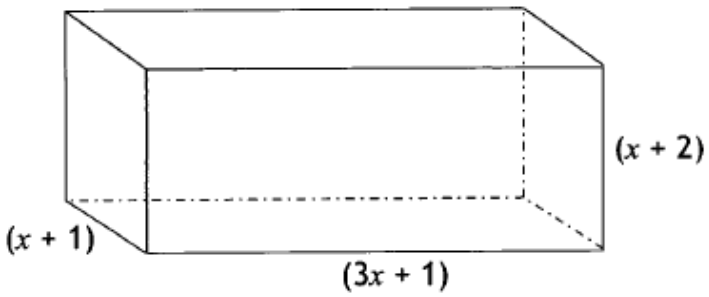
Volume of a cone: Volume = $\dfrac{1}{3}\pi r^2 h$

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

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

Marks

1. A cuboid has dimensions $(x + 1)$ cm, $(x + 2)$ cm, and $(3x + 1)$ cm.



a) Express the volume of the cuboid in terms of x. **1**

b) Expand and simplify this expression **2**

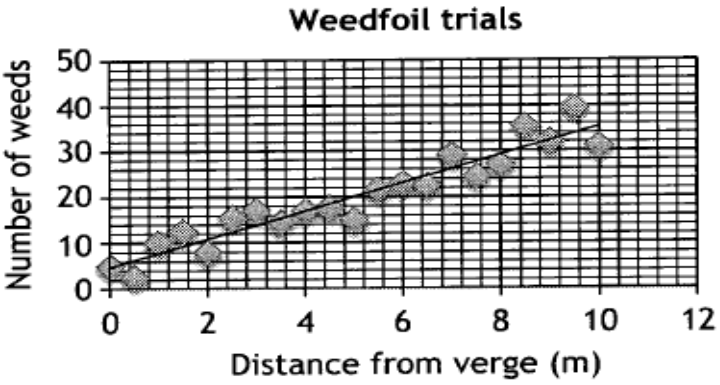
2. A signpost reads that the next village is $1\frac{3}{4}$ miles away.

I expect the journey to take $\frac{3}{4}$ of an hour.

Calculate the speed in miles per hour at which I need to travel.
Give your answer as a mixed number. **2**

3. Solve: $2x^2 + 9x + 4 = 0$ **3**

4. A weedkiller, called Weedfoil, was sprayed along a grass verge at the side of a moterway.
A week later the number of weeds found and their distance from the verge noted.
A scatter diagram was constructed and a best fitting straight line drawn.



4 metres from the verge the line suggests that 17 weeds were found.

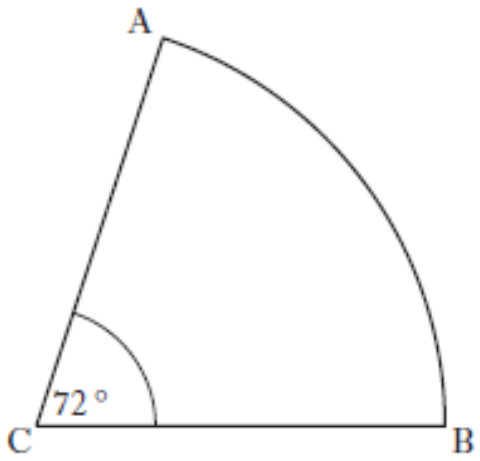
10 metres from the verge the line suggests that 35 weeds were found.

a) Find the equation of the best fitting straight line. **3**

b) Use your equation to predict the number of weeds expected 7m from the verge. **1**

Marks

5. The diagram shows a sector of a circle, centre *C*



The radius of the circle is 5 centimetres
and the angle ACB is 72°

Calculate the length of arc *AB*.

Take $\pi = 3.14$

3

6. **a)** Simplify the expression: $\dfrac{3x^{-3}}{x^{\frac{1}{3}}x^{-4}}$ **2**

b) Calculate its value when $x = 8$ **1**

7. Rationalise the denominator, leaving the fraction in its simplest form: $\dfrac{\sqrt{2}}{\sqrt{3}}$ **2**

8. Seven friends went to a local fair.
At the snack stall they were offered two different sandwich options.
Everyone took one of them.

If only two chose the cheaper option, the bill would come to £19.

a) Let £x be the cost of the cheaper option and £y be the cost of the dearer option.
Form an equation in x and y. **1**

b) If three choose the cheaper option then the bill would come to £18.
Form a second equation in x and y. **1**

c) What would the total bill be if four people choose the cheaper option. **3**

Marks

9. To repoint a small garden wall, a builder will charge according to the formula:

$$C = 72 + 8h^2$$

where £C is the cost and h metres is the height of the wall.

Make h the subject of the formula. **3**

10. Express the following fractions as a single fraction in its simplest form:

$$\frac{4}{x+2} - \frac{3}{x-4}, \qquad x \neq -2,\ x \neq 4$$

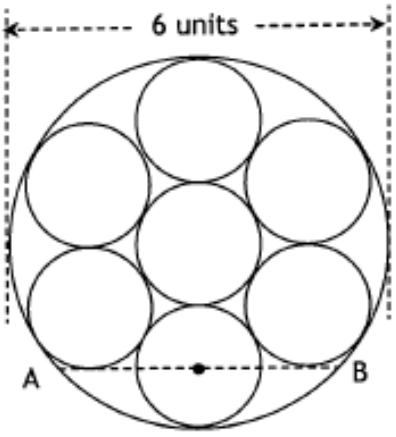
3

11. Two vectors are defined as $\underline{u} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ and $\underline{v} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$

a) Find the resultant vector $\underline{u} + 3\underline{v}$ **1**

b) Find $|\underline{u} + 3\underline{v}|$ **2**

12. Seven identical fibre-optic cables fit snuggly inside a larger pipe of diameter 6 units.
The diagram below represents their cross-sections as circles



a) What is the radius of one small cable? **1**

b) The chord AB passes through the centre of one of the smaller cables. How far is it from the centre of the larger pipe to this centre? **1**

c) What is the length of the chord AB, leaving your answer as a surd in its simplest form. **2**

13. Given that $f(x) = 5 - x^2$, evaluate $f(-3)$ **2**

Total Marks: 40

End of question Paper