St. Peter the Apostle High School

Mathematics Dept.

N5 Practice Prelim Five 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. Calculate $2\frac{1}{6} \times \frac{2}{5}$ **2**

2. Find the gradient and y-intercept of the line with equation $5x + 7y + 35 = 0$ **3**

3. Change the subject of this formula $V = \pi r^2 h$ to 'r' **2**

4. **a)** Factorise: $25x^2 - 49$ **2**

b) Factorise fully: $10x^2 + 9x - 7$ **2**

c) Hence, or otherwise, simplify $\dfrac{25x^2 - 49}{10x^2 + 9x - 7}$ **1**

5. Vectors $\underline{a}$ and $\underline{b}$ have components as follows: $\underline{a} = \begin{pmatrix} 4 \\ -3 \\ 4 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$

a) Find the components of the vector represented by $\underline{a} - 2\underline{b}$ **1**

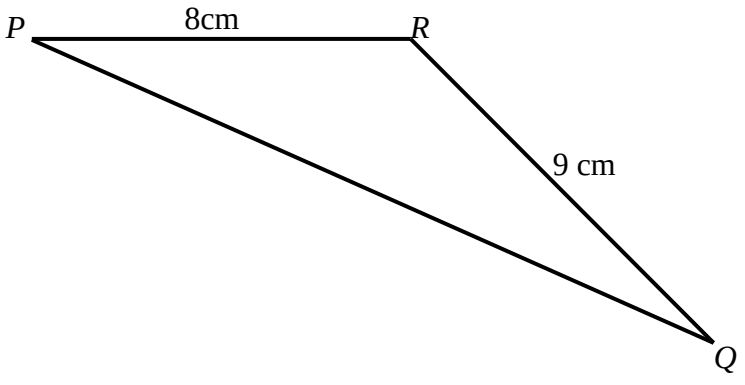
b) Calculate the magnitude of the vector represented by $\underline{a} - 2\underline{b}$ **2**

6. Multiply the brackets and simplify: $(x - 2)(5x^2 - 4x - 2)$ **3**

7. For the triangle PQR calculate the **exact value** of sin RPQ if:

the exact value of sin PQR is $\frac{1}{3}$

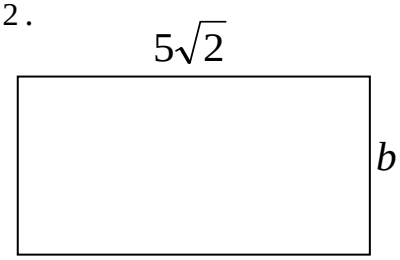
AC = 8cm and BC = 9cm



3

Marks

8. The area of this rectangle is 24 cm². It has length $5\sqrt{2}$.



Calculate its breadth, *b*, leaving your answer as a surd in its simplest form with a rational denominator.

Dimensions are in centimetres. **3**

9. Write as a single fraction in its simplest terms $\frac{2}{x-2}-\frac{5}{x+1}$, $x \neq 2;\ x \neq -1$ **3**

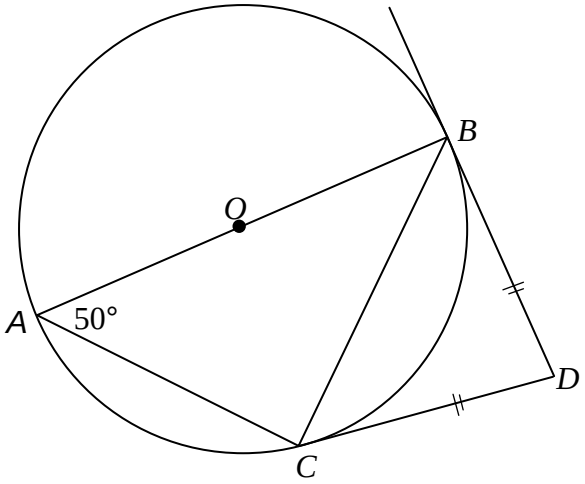
10. Simplify $x^4y^3 \div x^6y$ expressing your answer with positive powers. **2**

11. *AB* is a diameter and *O* is the centre of the circle shown below.

BD is a tangent to the circle with *B* the point of contact.

Triangle *BCD* is isosceles.

Given that angle *BAC* = 50°, find the size of angle *BDC*.



3

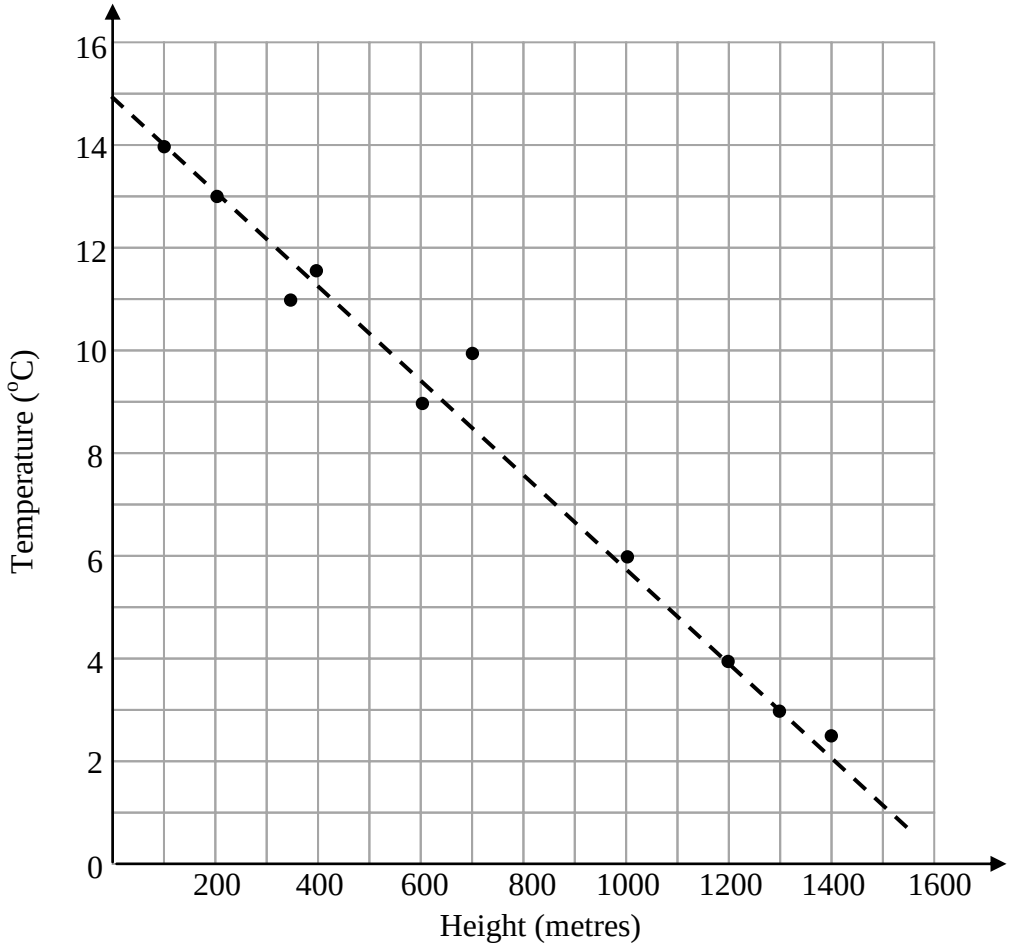
Marks

12. The graph shows the height above sea level, in metres, of ten places in Scotland and the corresponding mean temperature in degrees Celsius.

St. Andrews in Fife is 100 m above sea level and has a mean temperature of 14°C

The top of the Caitngorm is 1300 m above sea level and has a mean temperature of 3°C

Determine the equation of the line of best fit which has also been drawn on the graph.



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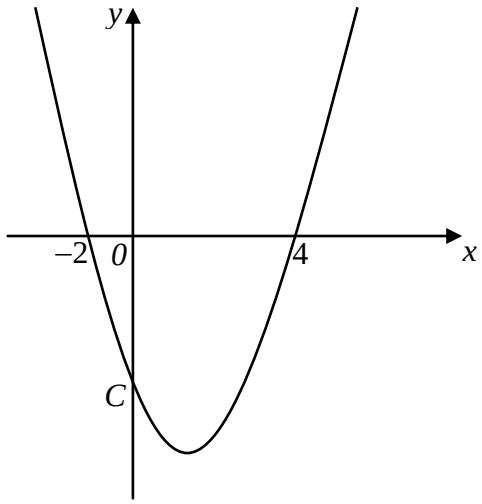
13. The graph shown has equation $y = (x + 2)(x - 4)$.



a) Find the coordinates of point C, where the graph cuts the y-axis. **2**

b) Find the coordinates of the turning point. **2**

c) State the equation of the axis of symmetry of the parabola. **1**

End of question Paper

Total Marks: 41