

St. Peter the Apostle High School

Mathematics Dept.



N5

Practice Prelim Eight 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 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

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

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

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

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

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

1. a) Change the subject of the formula below to a : $T = 2\sqrt{a} - b$ 3
 b) Hence find the value of a when $T = 1\frac{1}{6}$ and $b = \frac{1}{2}$. 3

2. Solve the equation: $5x - (x - 4) = 3(8 - 2x)$ 3

3. The number of people using a particular web service worldwide is 80 million.

For each of the next 3 years the number of people using this service is expected to be 5% more than the number in the previous year.



How many people are expected to be using this service in 3 years time?

Give your answer to the nearest million.

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4. A function is given as $f(x) = 2x^2 - 3x$.

a) Find $f(-2)$ 2

b) Given that $f(p) = 5$, find the two values of p 3

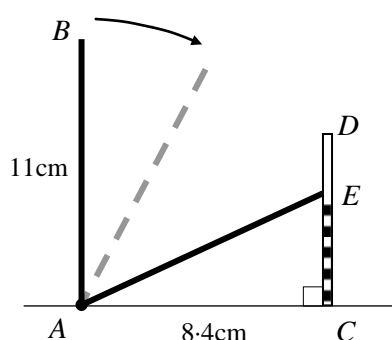
5. In a switch mechanism lever AB rotates around A until it rests against the rod CD .

Point B touches rod CD at E .

$AB = 11\text{cm}$ and $AC = 8.4\text{cm}$ as shown.

For the switch to work the distance from C to E must be **more than** 7cm.

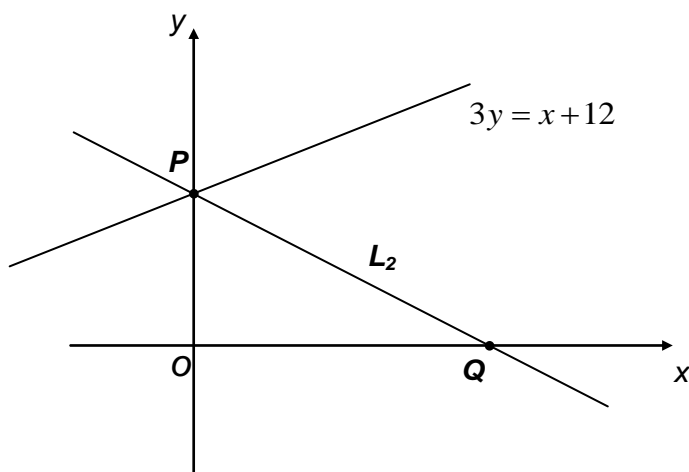
Will this switch mechanism work?



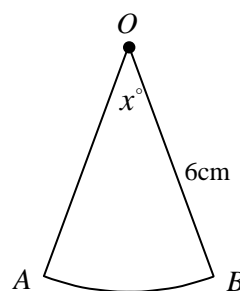
Your answer must be accompanied by appropriate working and explanation.

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6. The diagram below shows the line with equation $3y = x + 12$.



- a) Find the coordinates of P , the point where the line cuts the y-axis. 1
- b) A second line L_2 also passes through P and has a gradient of $-\frac{1}{2}$.
Find the coordinates of Q , the point where this second line crosses the x-axis. 4
7. Simplify fully the fraction: $\frac{6e^2 - 3e}{4e^2 - 1}$ 3
8. Given $x * y = (x + y)^2 - 2(x + 2y)$.
Find an expression for $a * 4$ in its simplest form. 3
9. A sector of a circle with radius 6cm is shown opposite.
Angle $AOB = x^\circ$
If the exact **area** of the sector is 4π square centimetres,
calculate the size of the angle marked x . 4



10. Factorise fully: $3x^2 - 6x - 9$ 2