PREPARATORY PRELIMINARY MATHEMATICS
WORKSHEET #1

COURSE/LEVEL
NSW Secondary High School Year 11 Preliminary Mathematics.

1. Give an equation for the straight line which is parallel to the y–axis and passes through the point $(2, -3)$.

2. Calculate the volume of a cylinder of base radius 5 metres and height 3 metres. (Leave your answer in exact form.)

3. Make y the subject of the formula: $\dfrac{1-y}{y} = x$.

4. Simplify: $\dfrac{\left(1.3\times10^{-3}\right)^2}{6.5\times10^{-7}}$

5. Simplify $(81)^{-\frac{3}{4}}$

6. Simplify $\sqrt{\dfrac{3x^{-3}}{y} \div \dfrac{27x}{4y^3}}$

7. Find the x–intercepts of the graph with equation $y = x^2 + 7x - 8$.

8. If $\tan\theta = 0.9916$, find angle θ correct to the nearest minute.

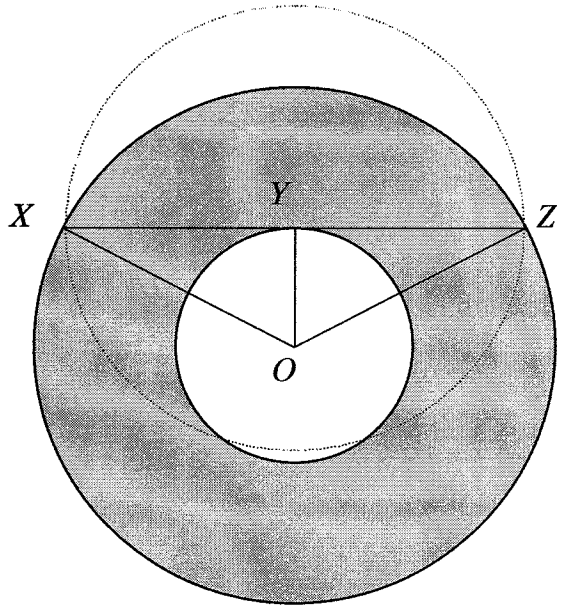
9. Expand and simplify: $\left(2\sqrt{2} - \sqrt{5}\right)^2$.

10. Solve for y: $60 - (2y+1)^2 = 24$.

11. The shaded region is an annulus, formed by a small circle of radius k and a large circle of radius $2k$. The circles forming the annulus both have the same centre O.

(a) Find the area of the annulus in terms of k.

(b) X and Z are points which lie on the circumference of the larger circle. OY is a radius of the smaller circle and point Y is the midpoint of XZ. Another circle, shown as a dotted line, has XZ as its diameter. Show that this circle has the same area as the annulus.



Prepatory Preliminary Mathematics

Excellent work!

Worksheet #1

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1. $x = 2$ ✓

2. $V = \pi r^2 h$
$= (75\pi)\ m^3$ ✓

3. $\frac{1-y}{y} = x$

$1 - y = xy$

$1 - xy = y$ ✓

$1 = y + xy$

$1 = y(1+x)$

$\therefore y = \frac{1}{1+x}$ ✓

4. 2.6 ✓

5. $(81)^{-\frac{3}{4}} = \frac{1}{\sqrt[4]{81^3}}$

$= \frac{1}{27}$ ✓

6. $\sqrt{\frac{\frac{1}{3x^3}}{y} \times \frac{4y^3}{27x}}$

$= \sqrt{\frac{1}{3x^3 y} \times \frac{4y^3}{27x}}$ ✓

$= \sqrt{\frac{4y^2}{81x^4}}$

$= \frac{2y}{9x^2}$ ✓

7. $y = x^2 + 7x - 8$ Let $y = 0$

$0 = x^2 + 7x - 8$

$= (x+8)(x-1)$ ✓

$\therefore$ x-intercepts are $(-8, 0)$, $(1, 0)$ ✓

8. $\theta = 44°46'$ ✓

9. $8 - 4\sqrt{10} + 5 = 13 - 4\sqrt{10}$ ✓

10. $60 - (2y+1)^2 = 24$

$60 - (4y^2 + 4y + 1) = 24$

$36 - 4y^2 - 4y - 1 = 0$ ✓

$-4y^2 - 4y + 35 = 0$

Sum: -4
Product: -140
Numbers: $-14, +10$

$-4y^2 - 14y + 10y + 35 = 0$

$-2y(2y+7) + 5(2y+7) = 0$

$\therefore (-2y+5)(2y+7) = 0$

$\therefore y = \frac{5}{2}, -\frac{7}{2}$ ✓

Quicker if
$(2y+1)^2 = 60 - 24$
$= 36$

$\therefore 2y + 1 = \pm\sqrt{36}$

$2y = -1 \pm 6$

$y = \frac{5}{2}$ or $-\frac{7}{2}$

11. (a) $A_I = \pi r^2$ (big circle) ✓
$= 4k^2\pi$

$A_{II} = k^2\pi$ (smaller circle) ✓

$\therefore$ A of annulus $= A_I - A_{II}$
$= 4k^2\pi - k^2\pi$
$= (3k^2\pi)$ units^2 ✓

(b) $OX^2 = OY^2 + XY^2$

$\therefore 4k^2 - k^2 = XY^2$

$3k^2 = XY^2$ ✓

$\therefore XY = k\sqrt{3}$

$\therefore$ radius of 2nd circle is $k\sqrt{3}$ units

$\therefore A = \pi(k\sqrt{3})^2$
$= (3k^2\pi)$ units^2 ✓

$\therefore$ This circle has the same ✓