PRE-TEST EXAM QUESTIONS – WORKED SOLUTIONS

1. FORMULAS (6 Marks)

a) Area of a Trapezium

$$A = \frac{1}{2}h(a+b)$$

b) Surface Area

i) Cylinder: SA = $2\pi r^2 + 2\pi rh$

ii) Cone: SA = $\pi r^2 + \pi rl$

iii) Sphere: SA = $4\pi r^2$

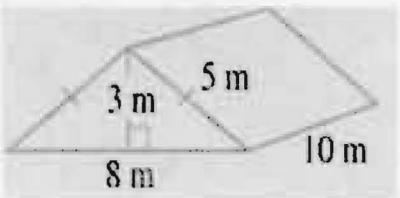
c) Volume

i) Cone: $V = \frac{1}{3}\pi r^2 h$

ii) Sphere: $V = \frac{4}{3}\pi r^3$

2. Surface Area and Volume Questions (8 Marks)

a) Find the Surface Area of this Triangular Prism



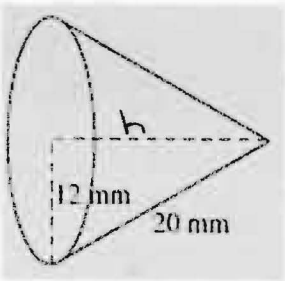
SA = 2 triangles + 3 rectangles

$= 2\times(\frac{1}{2}\times 8\times 3) + 2\times(5\times 10) + 8\times 10$

$= 24 + 100 + 80$

$= 204\,m^2$

b) i) Find the perpendicular height of this cone.



$h^2 = 20^2 - 12^2$

$h = \sqrt{256}$

$h = 16mm$

ii) Find the volume of this cone.

$V = \frac{1}{3}\times\pi\times 12^2\times 16$

$= 2412.7\,mm^3$

iii) Find the Surface Area of this cone.

$SA = \pi\times 12^2 + \pi\times 12\times 20$

$= 1206.4\,mm^2$

3. Surds (8 Marks)

a) Simplify:

i) $\sqrt{18}\times 8\sqrt{3} = \sqrt{9}\times\sqrt{2}\times 8\times\sqrt{3}$

$= 3\sqrt{2}\times 8\sqrt{3}$

$= 24\sqrt{6}$

ii) $2\sqrt{27} - 4\sqrt{12} + 3\sqrt{48}$

$= 2\times\sqrt{9}\times\sqrt{3} - 4\times\sqrt{4}\times\sqrt{3} + 3\times\sqrt{16}\times\sqrt{3}$

$= 2\times 3\times\sqrt{3} - 4\times 2\times\sqrt{3} + 3\times 4\times\sqrt{3}$

$= 6\sqrt{3} - 8\sqrt{3} + 12\sqrt{3} = 10\sqrt{3}$

b) Expand and Simplify:

$(2\sqrt{3}-3)^2$ OR $(2\sqrt{3}-3)(2\sqrt{3}-3)$

$(2\sqrt{3})^2 - 2\times 2\sqrt{3}\times 3 + 3^2$ | $2\sqrt{3}\times 2\sqrt{3} - 2\sqrt{3}\times 3 - 3\times 2\sqrt{3} + 3\times 3$

$12 - 12\sqrt{3} + 9$ | $12 - 6\sqrt{3} - 6\sqrt{3} + 9$

$21 - 12\sqrt{3}$ | $= 21 - 12\sqrt{3}$

c) Rationalise the denominator:

$$\frac{5}{4-\sqrt{6}}\times\frac{4+\sqrt{6}}{4+\sqrt{6}} = \frac{5(4+\sqrt{6})}{(4)^2-(\sqrt{6})^2}$$

$$= \frac{5(4+\sqrt{6})}{16-6}$$

$$= \frac{5(4+\sqrt{6})}{10} = \frac{4+\sqrt{6}}{2}$$