SOLUTIONS

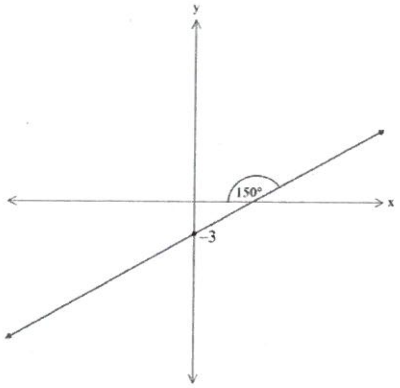
Unit 1
Semester 1 2018
Mathematics Methods Test 1

Baldivis Secondary College

Calculator Assumed

Question 6 **(2 marks)**

Determine the equation of the linear function shown below. All values should be expressed in exact form.



$m = \frac{\text{Rise}}{\text{RUN}} = \frac{x}{y} = \frac{\sin}{\cos} = \tan$.

$= \tan 30°$

$m = \frac{1}{\sqrt{3}}$ ✓

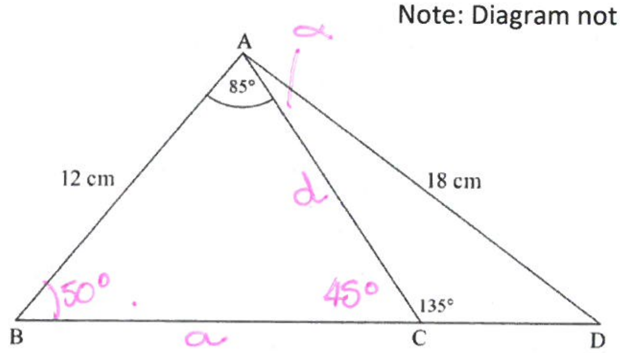
$y = mx + c$

$y = \frac{1}{\sqrt{3}}x - 3$ ✓ $= \frac{\sqrt{3}}{3}x - 3$

Question 7 **(6 marks)**

Determine, correct to 2 decimal places, the length of side BD in the diagram below.

Note: Diagram not drawn to scale.



$\frac{a}{\sin 85°} = \frac{12}{\sin 45°}$

$a = 16.906\text{ cm}$

$\frac{d}{\sin 50} = \frac{12}{\sin 45°}$

$d = 13\text{cm}$.

$\frac{13}{\sin D} = \frac{18}{\sin 135°}$

$D = 30.71°$

$\therefore \alpha = 14.29°$.

$\frac{y}{\sin 14.29} = \frac{18}{\sin 135°}$

$y = 6.283$ ✓

So $BD = 6.283 + 16.906$

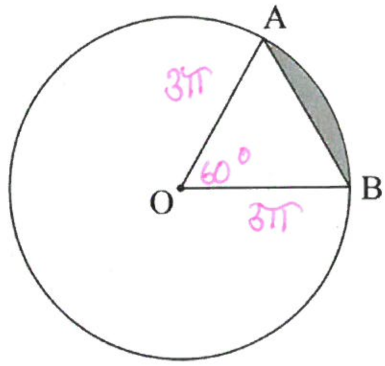
$\overline{BD} = 23.19\text{ cm}$

Question 8

(8 marks)

The circle shown with centre O has a radius of 3π cm.

If the size of $\angle AOB = 60°$, determine the



(a) area of triangle AOB as an **exact** value in terms of π.

$A = \frac{1}{2}(3\pi)^2 \sin 60°.$

$= \frac{1}{2}(3\pi)^2 \frac{\sqrt{3}}{2} = \frac{9\sqrt{3}\pi^2}{4}.$

(b) length of the ***major*** arc AB accurate to 2 decimal places. (2 marks)

$l = r\theta$

$360 - 60 = 300° \times \frac{\pi}{180}$

$= \frac{5\pi}{3}$

$= 3\pi\left(\frac{5\pi}{3}\right)$ ✓

$= \underline{49.35\text{cm}}$ ✓

(c) area of the ***minor*** sector AOB to the nearest cm^2. (2 marks)

$A = \frac{1}{2}(3\pi)^2 \frac{\pi}{3}$ ✓

$= 46.5\text{cm}^2$ ✓

(d) area of the ***minor*** segment (shaded) formed by the chord AB accurate to 3 significant figures. (2 marks)

$A = \frac{1}{2}(3\pi)^2 \left[\frac{\pi}{3} - \sin\frac{\pi}{3}\right)$ ✓

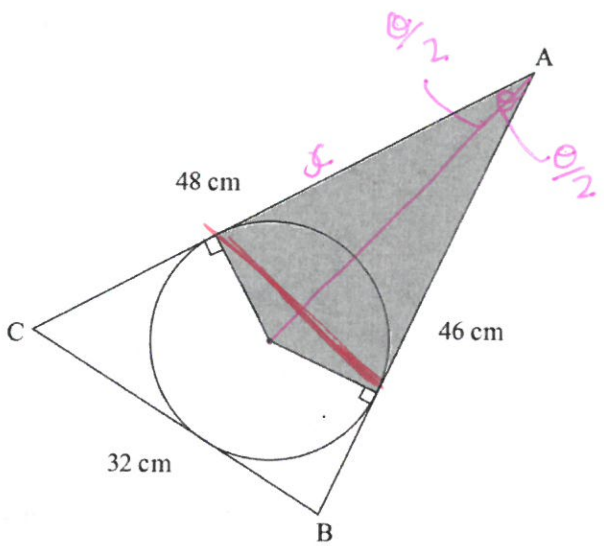
$= 8.06\text{cm}^2$

✓

Question 9

(5 marks)

Triangle ABC drawn below has sides of 32 cm, 46 cm and 48 cm. The circle with a radius of 11 cm is inscribed inside the circle and just touches the three sides of the triangle.



Note: Diagram not drawn to scale.

Determine the area of the shaded region. (Hint: First find the size of ∠BAC).

$a^2 = b^2 + c^2 - 2bc\cos a$

$\cos\theta = \dfrac{48^2 + 46^2 - 32^2}{2(48)(46)}$

$\theta = 39.73°$

$\tan\dfrac{\theta}{2} = \dfrac{11}{x}$

$x = \dfrac{11}{\tan\frac{\theta}{2}}$

$= \dfrac{11}{\tan 19.867°}$

$x = 30.442$

$\text{Area} = \frac{1}{2} b \times h$

$= \frac{1}{2}(11)(30.442)$

$= 167.43$

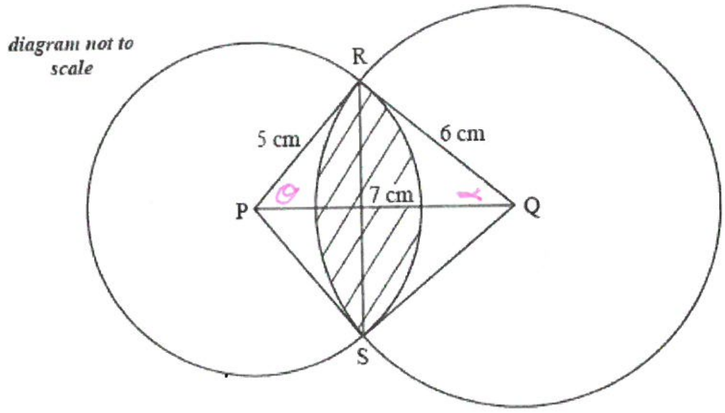
$\times 2$

$\therefore$ Shaded Area

$= 334.86\ \text{cm}^2$

Question 10 **(10 marks)**

The diagram below shows a pair of intersecting circles with centres at P and Q with radii of 5 cm and 6 cm respectively. RS is the common chord of both circles and PQ is 7 cm.



Find the area of the shaded region.

$a^2 = b^2 + c^2 - 2bc\cos A.$

$\cos\theta = \frac{5^2+7^2-6^2}{2\times5\times7}$

$\cos\theta = 0.5429$

$\theta = 57.12°$

$2\theta = 114.24°$

$A = \frac{\theta}{360}\pi r^2 - \frac{1}{2}r^2\sin\theta$

$= \frac{114.24}{360}\times\pi(5)^2 - \frac{1}{2}(5)^2\sin 114.24°$

$A = 13.53\text{cm}^2$

$\cos\alpha = \frac{7^2+6^2-5^2}{2\times7\times6}$

$\alpha = 44.42°$

$2\alpha = 88.84°$

$A = \frac{\theta}{360}\pi r^2 - \frac{1}{2}r^2\sin\theta$

$= \frac{88.84}{360}\times\pi(6^2) - \frac{1}{2}(6)^2\sin 88.8$

$A = 9.91\text{cm}^2$

Total Area $= 13.53 + 9.91$

$= 23.44\text{cm}^2.$

End of Test