1. Write down the exact values of:

   (a) $\sin 30°$, (b) $\cos 45°$, (c) $\tan 30°$, (d) $\sec 30°$.

2. A steamship is N27°W from an island lighthouse, and a sailing boat is N63°E from the lighthouse. If the ship is 12 km due west of the boat, find the distance of the boat from the lighthouse (nearest metre). you must include a neat diagram with your answer.

3. In the triangle JKL, $\angle J = 27°$, $JK = 9$ cm and $KL = 7$ cm. Use the sine rule to find two possible values for $\angle L$ (nearest minute).

4. In the triangle RST, $\angle R = 57°$, $RS = 8$ metres and $RT = 10$ metres.

   (a) Find ST correct to the nearest millimetre.

   (b) Find the area of $\triangle RST$ correct to the nearest 0·01 square metre.

5. A triangle ABC has sides of length $AB = 5$ cm, $BC = 6$ cm and $CA = 7$ cm.

   (a) Show that $\cos B = \frac{1}{5}$.

   (b) Hence find $\sin B$ in exact form.

   (c) Hence find the area of $\triangle ABC$, again in exact form.

6. Solve these trig equations:

   (a) $3\tan\theta - 2\cot\theta = 5$, $0° \leq \theta \leq 360°$.

   (b) $\cot(\theta - 240°) = -1$, $0° \leq \theta \leq 360°$.

   (c) $\sqrt{3}\sec^2\theta - 2\tan\theta - 2\sqrt{3} = 0$, $0° \leq \theta \leq 360°$.

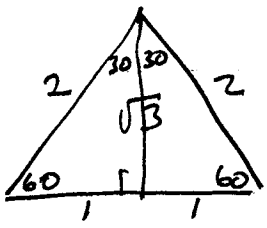
7. Show that $\dfrac{1+\cot\theta}{\operatorname{cosec}\theta} - \dfrac{1+\tan\theta}{\sec\theta}$ is independent of θ. (hint: just simplify the expression).

8. By squaring and adding, eliminate θ from the pair of equations:

$$x\sin\theta + y\cos\theta = a$$
$$x\cos\theta - y\sin\theta = b.$$

5F. Trig Test 27th.

1.



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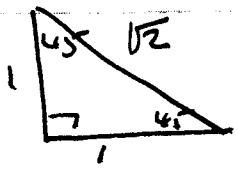


(a) $\sin 30^\circ = \frac{1}{2}$ ✓

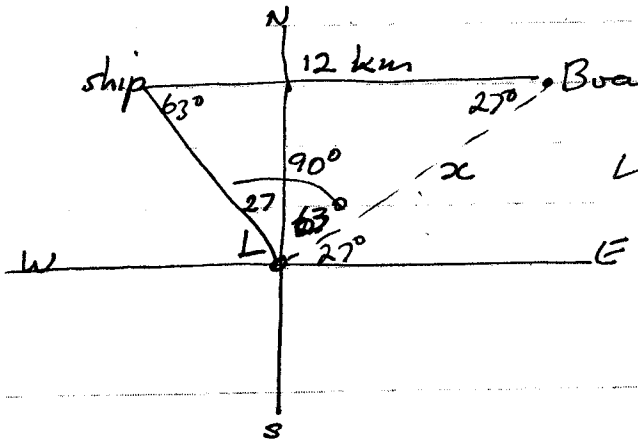
(b) $\cos 45^\circ = \frac{1}{\sqrt{2}}$ ✓

(c) $\tan 30^\circ = \frac{1}{\sqrt{3}}$ ✓

(d) $\sec 30^\circ = \frac{1}{\cos 30^\circ} = \frac{2}{\sqrt{3}}$ ✓

2.

3.



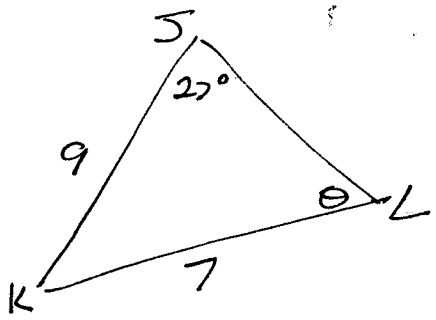
$\sin 63^\circ = \frac{x}{12}$ ✓

$x = 12 \sin 63^\circ$

$= 10.692$ km ✓ or (10692 m)

3.

4



$\frac{\sin\theta}{9} = \frac{\sin 27^\circ}{7}$ ✓

$\sin\theta = 9 \times \frac{\sin 27^\circ}{7}$

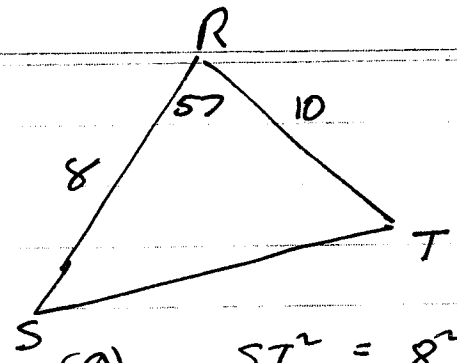
$= 0.5837$ ✓

related angle is $35^\circ 43'$

$\theta = 35^\circ 43'$ or $144^\circ 17'$ ✓

4.

4.



(a) $ST^2 = 8^2 + 10^2 - 2.8.10.\cos 57^\circ$ ✓

$= 76.85577544$

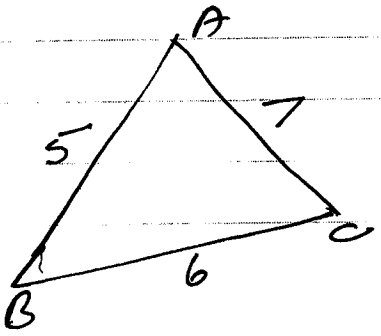
$ST = 8.767\text{m}$ ✓ (or 8767 mm)

(b) Area $= \frac{1}{2} \times 8 \times 10 \times \sin 57^\circ$ ✓

$= 40 \sin 57^\circ$

$= 33.55\ m^2$ ✓

5.

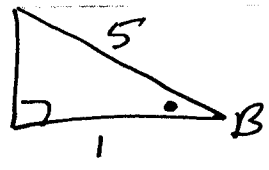


(a) ~~$6^2 = 5^2 + 7^2$~~

$7^2 = 5^2 + 6^2 - 2.5.6.\cos B$ ✓

$\cos B = \frac{12}{60}$ ✓ $= \frac{1}{5}$

(b)



$\sqrt{24} = 2\sqrt{6}$

$\sin B = \frac{2\sqrt{6}}{5}$ ✓

(c) Area $= \frac{1}{2} \cdot 5 \cdot 6 \cdot \frac{2\sqrt{6}}{5}$ ✓

$= 6\sqrt{6}\ cm^2$ ✓

6. (a) $3\tan\theta - 2\cot\theta = 5$

6. $3\tan\theta - \frac{2}{\tan\theta} - 5 = 0$

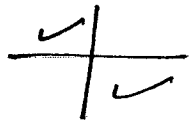
16

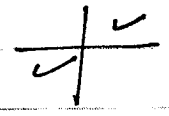
$3\tan^2\theta - 5\tan\theta - 2 = 0$ ✓

$(3\tan\theta + 1)(\tan\theta - 2) = 0$ ✓

$3\tan\theta = -1$ $\qquad$ $\tan\theta = 2$

$\tan\theta = -\frac{1}{3}$





related angle is $18°26'$

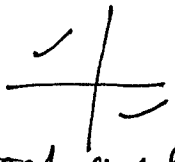
$\theta = 161°34', 341°34'$

related angle is $63°26'$

$\theta = 63°26', 243°26'$

(b) $\cot(\theta - 240°) = -1$ $\qquad$ $0 \le \theta \le 360$

4. $\tan(\theta - 240°) = -1$ ✓ $\qquad$ $-240° \le \theta - 240 \le 120°$



related angle is $45°$ ✓

$\theta - 240° = -180° - 45°, -45°$

$= -225°, -45°$

$\theta = 15°, 195°$

(c) $\sqrt{3}\sec^2\theta - 2\tan\theta - 2\sqrt{3} = 0$ $\qquad$ $\frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\cos^2\theta} =$

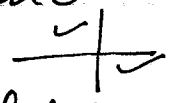
6 $\sqrt{3}(\tan^2\theta + 1) - 2\tan\theta - 2\sqrt{3} = 0$ $\qquad$ $\tan^2\theta + 1 = s$

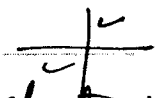
$\sqrt{3}\tan^2\theta + \sqrt{3} - 2\tan\theta - 2\sqrt{3} = 0$

$\sqrt{3}\tan^2\theta - 2\tan\theta - \sqrt{3} = 0$

$(\sqrt{3}\tan\theta + 1)(\tan\theta - \sqrt{3}) = 0$ ✓

$\tan\theta = -\frac{1}{\sqrt{3}}$ $\qquad$ $\tan\theta = \sqrt{3}$





related angle is $30°$

$\theta = 150°, 330°$

related angle is $60°$

$\theta = 60°, 240°$

7. $\frac{1+\cot\theta}{\operatorname{cosec}\theta} - \frac{1+\tan\theta}{\sec\theta}$

3

$$= \frac{1+\frac{\cos\theta}{\sin\theta}}{\frac{1}{\sin\theta}} - \frac{1+\frac{\sin\theta}{\cos\theta}}{\frac{1}{\cos\theta}} \times \frac{\sin\theta\cos\theta}{\sin\theta\cos\theta}.$$

$$= \frac{\sin\theta\cos\theta+\cos^2\theta}{\cos\theta} - \frac{\sin\theta\cos\theta+\sin^2\theta}{\sin\theta}.$$

$$= (\sin\theta+\cos\theta) - (\cos\theta+\sin\theta)$$

$$= 0 \quad \text{which is indep of } \theta.$$

8. $x^2\sin^2\theta + 2xy\sin\theta\cos\theta + y^2\cos^2\theta = a^2$

3 $x^2\cos^2\theta \mp 2xy\sin\theta\cos\theta + y^2\sin^2\theta = b^2$

adding. $x^2\sin^2\theta + x^2\cos^2\theta + y^2\cos^2\theta + y^2\sin^2\theta = a^2+b^2$

$x^2(\sin^2\theta+\cos^2\theta) + y^2(\cos^2\theta+\sin^2\theta) = a^2+b^2$

$x^2+y^2 = a^2+b^2.$