Name: KEY

Date:

27/29 SSA – Calculator Section

(Trigonometry & Circle Geometry)

25 Minutes

/18

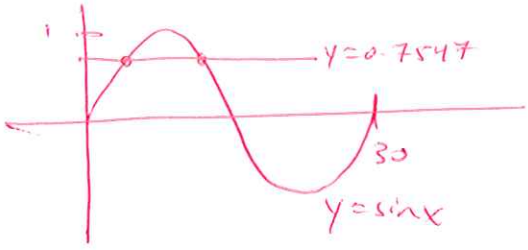
Mode = degrees!

1. Find all the angles from x, $0^\circ \le x \le 360^\circ$ that make the following equation true. **[2]**

$$\underbrace{\sin x^\circ}_{y_1} = \underbrace{0.7547}_{y_2}$$

- 1 mark for each correct angle.

Method 1: Graph



$x \cong 131.00084\ldots$ or $\cong 48.999163\ldots$

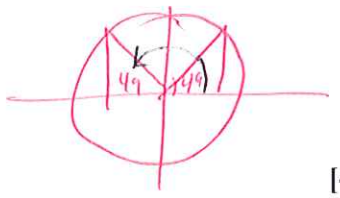
$\therefore x \cong 49.0$ or 131 (3SF) A1 A1

Method 2:

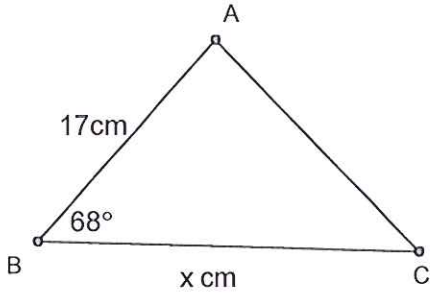
$x_1 = \sin^{-1}(0.7547)$
$\cong 48.999\ldots$
$= 49.0$ (3SF)

and $x_2 = 180 - 49$
$= 131$

- penalize 1 mark for 3SF
- allow "method" marks.



2. If triangle ABC has area 150 cm^2, find the value of x. **[4]**



$A = \frac{1}{2}ab\sin\theta$

$150\text{cm}^2 = \frac{1}{2}(17\text{cm})(x)\sin 68$ M2

$\therefore \dfrac{2 \cdot 150\text{ cm}^2}{17\text{cm} \cdot \sin 68} = x$ M1

$\therefore x \approx 19.0329\ldots$

$x \approx 19.0$ cm (3SF) A1

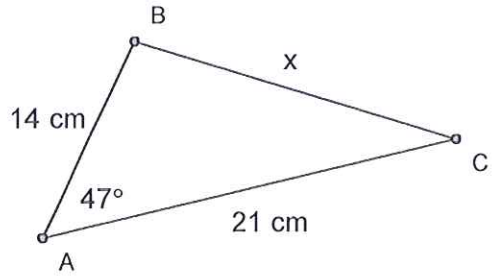
$\therefore$ units not necessary.... but encouraged!

penalize 1 mark if mode in radians

$\Rightarrow$ (ans $\Rightarrow -19.65\ldots$ which does not make sense anyways.)

/6

3. Find the value of x. **[3]**



M2

$x^2 = 14^2 + 21^2 - 2(14)(21)\cos 47$ $\Rightarrow$ GDC

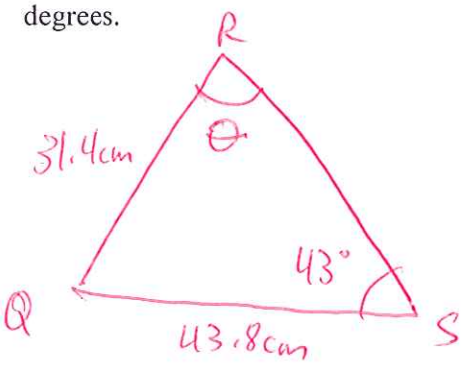
$\sqrt{x^2} = \sqrt{235.984\ldots}$ M1

$\therefore\ x \cong 15.3618\ldots$

$x \cong 15.4\text{ cm}$ (3SF) A1

penalize 1 mark if mode is in radians $\Rightarrow$ ans = 34.9

4. In triangle QRS, find the measure of angle R if r = 43.8 cm, s = 31.4cm and angle S is 43 degrees. **[3]**



M1 (for correct labeling)

$\therefore\ \dfrac{\sin 43}{31.4} = \dfrac{\sin\theta}{43.8}$ M1

$\dfrac{43.8\sin 43}{31.4} = \sin\theta$

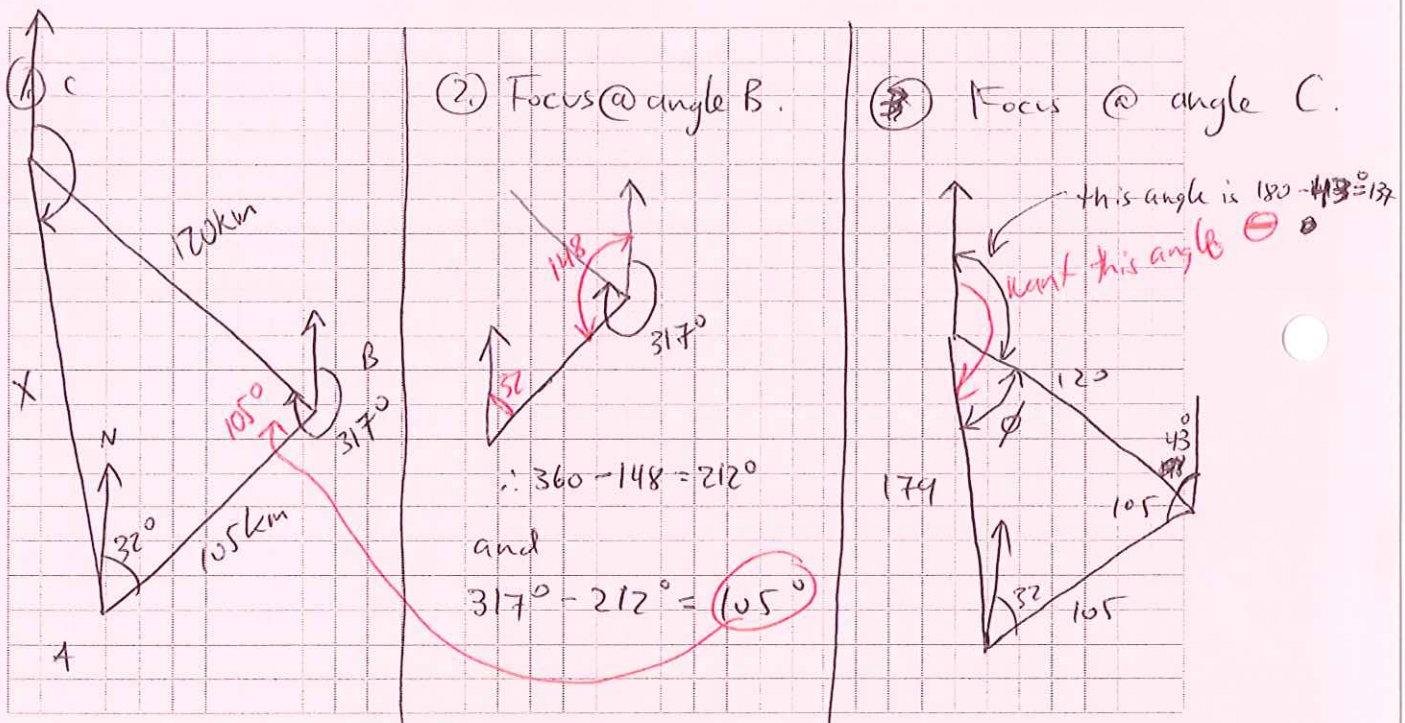
$\therefore\ \sin^{-1}\left(\dfrac{43.8\sin 43}{31.4}\right) = \theta$

$\theta \cong 72.049\ldots$

$\theta \cong 72.0$ (3SF) A1

5. A family in Germany drives at 140 kmph for 45 minutes on a bearing of 32° and then 180 kmph for 40 minutes on a bearing of 317°. Find the **distance and bearing** of the car to its starting position from the finishing position.

(remember from physics, Distance = speed x time!!) **[6]**



∴ bearing 1: 032°

distance = 140 km/h · 0.75h
= 105 km

bering 2: 317°

d = (180 km/h)(2/3 h)
= 120 km

To find x:

Cosine rule:

$x^2 = 120^2 + 105^2 - 2(120)(105)\cos 105^\circ$

$\therefore x \approx 178.7$ km
≈ 179 km (3SF)

To find bearing (See drawing 3)

Sine rule: $\frac{\sin\phi}{105} = \frac{\sin 105}{179}$

$\therefore \sin^{-1}\left(\frac{105\sin(105)}{179}\right) = \phi \cong$
$\cong 34.514^\circ$

$\therefore 137^\circ + 34.514^\circ$
$\cong 171.5^\circ$
$\cong 172^\circ$
(3SF)

EXTRA CREDIT **only attempt if you are finished with the rest of the test!**

Triangle ABC has sides of length a, b, and c units. A cirlce of radius r is drawn through the vertices of the triangle. Show that the area of the trianlge is given by the formula $A = \frac{abc}{4r}$.