Name: Key Date: _____

★ = Calculator Allowed

Unit 7 Test Review

What values for θ ($0 \le \theta < 2\pi$) satisfy the equation?

B 1. $\sin 2\theta + \cos\theta = 0$

a. $\frac{\pi}{2}, \frac{3\pi}{4}, \frac{3\pi}{2}, \frac{7\pi}{4}$

b. $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$

c. $\frac{\pi}{2}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

d. $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}$

$2\sin\theta\cos\theta + \cos\theta = 0$

$\cos\theta(2\sin\theta + 1) = 0$

$\cos\theta = 0$ $\quad \sin\theta = -\frac{1}{2}$

$\theta = \frac{\pi}{2}, \frac{3\pi}{2} + \frac{7\pi}{6}, \frac{11\pi}{6}$

D 2. $4\cos^2\theta\sin\theta - 3\sin\theta = 0$

a. $\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$

b. $\frac{\pi}{2}, \frac{\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$

c. $0, \frac{\pi}{6}, \pi, \frac{11}{6}$

d. $0, \frac{\pi}{6}, \frac{5\pi}{6}, \pi, \frac{7\pi}{6}, \frac{11\pi}{6}$

$4(1-\sin^2\theta)\sin\theta - 3\sin\theta = 0$

$(4-4x^2)x - 3x = 0$

$4x - 4x^3 - 3x = 0$

$-4x^3 + x = 0$

$x(-4x^2 + 1) = 0$

$-x(4x^2 - 1) = 0$

$-x(2x+1)(2x-1) = 0$

$-\sin x = 0$	$x = -1/2$	$x = +1/2$
$\sin x = 0$	$\sin x = -1/2$	$\sin x = \frac{1}{2}$
$x = \pi, 0$	$x = \frac{7\pi}{6}, \frac{11\pi}{6}$	$\frac{\pi}{6}, \frac{5\pi}{6}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$ 3. Find ALL solutions to: $2\cos 2\theta = 1$

$2(1 - 2\sin^2\theta) = 1$ → $2 - 4\sin^2\theta - 1 = 0$

$1 - 4\sin^2\theta = 0$

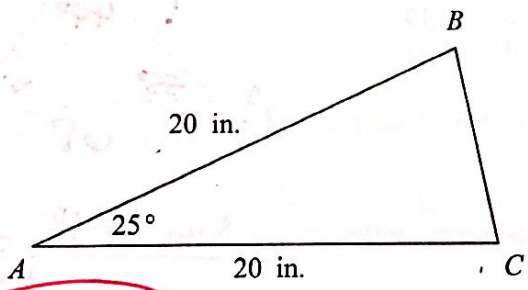
$\sin^2\theta = 1/4$ → $\sin\theta = \pm\frac{1}{2}$

OR see below!

What is the area of ΔABC to the nearest tenth of a square meter?

★ A 4.

SAS



a. 84.5 in.²

b. 93.3 in.²

c. 200 in.²

d. 169.0 in.²

$A = \frac{1}{2}(20)(20)\sin 25°$

Alternate Approach to #3:

$2\cos 2\theta = 1$

$\cos\square = 1/2$

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

$\square = 2\theta$

$\frac{2\theta}{2} = \frac{\pi}{3} \cdot \frac{1}{2}$ or $\frac{2\theta}{2} = \frac{5\pi}{3} \cdot \frac{1}{2}$

1 $\theta = \frac{\pi}{6}$ $\quad \theta = \frac{5\pi}{6}$

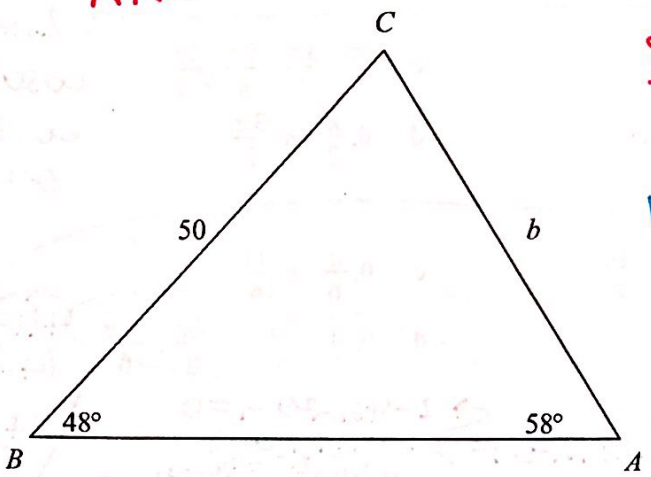
ID: A

Name: _____

Use the Law of Sines to find the missing side of the triangle.

★ B 5. Find b.

AAS

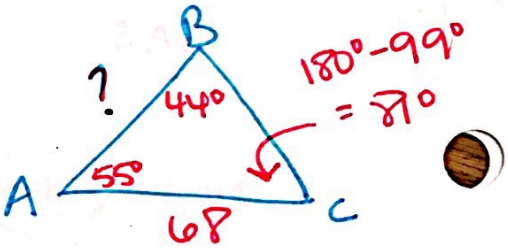


$\frac{\sin 58°}{50} = \frac{\sin 48°}{b}$

$b = \frac{50 \sin 48°}{\sin 58°}$

a. 70.1 b. 43.8 c. 57.1 d. 31.5

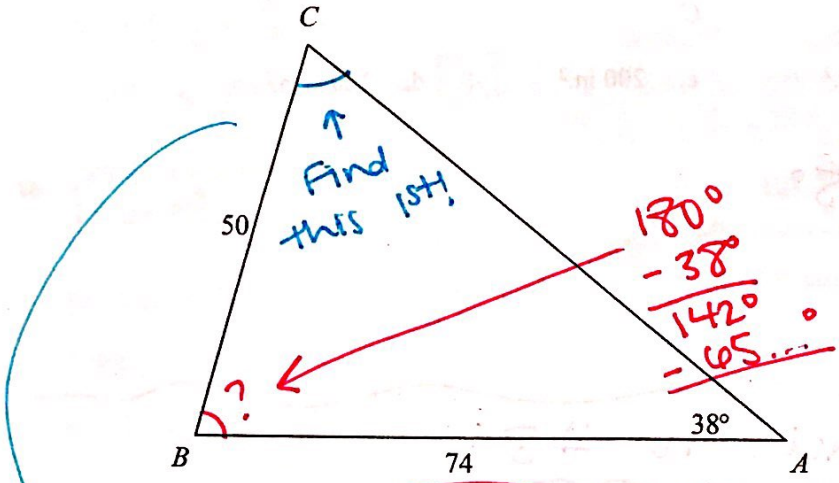
★ B 6. Find the measure of $\overline{AB}$ given $m\angle A = 55°$, $m\angle B = 44°$, and $b = 68$.



a. 45.22
b. 96.68
c. 88.19
d. 81.12

Use the Law of Sines to find the missing angle of the triangle.

★ B 7. Find $m\angle B$ to the nearest tenth.



$\frac{\sin 44°}{68} = \frac{\sin 81°}{?}$

$? = \frac{68 \sin 81°}{\sin 44°}$

a. 24.6° b. 76.3° c. 65.7° d. 155.4°

$\frac{\sin 38°}{50} = \frac{\sin C}{74}$

$\frac{74 \sin 38°}{50} = \frac{50 \sin C}{50}$

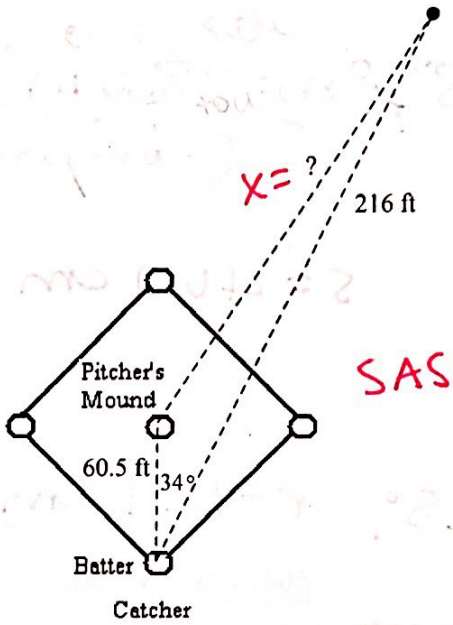
$\sin C = (.911179)$

$C \approx 65.669°$

Name: _____ ID: A

Use the Law of Cosines to solve the problem.

C 8. On a baseball field, the pitcher's mound is 60.5 feet from home plate. During practice, a batter hits a ball 216 feet deep. The path of the ball makes a 34° angle with the line connecting the pitcher and the catcher, to the right of the pitcher's mound. An outfielder catches the ball and throws it to the pitcher. How far does the outfielder throw the ball?



Law of Cosines

$x^2 = 60.5^2 + 216^2 - 2(60.5)(216)\cos(34°)$

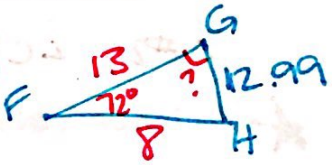
SAS

a. 207.4 ft b. 224.3 ft c. 169.3 ft d. 198.7 ft

B 9. In ΔFGH, $g = 8$ ft, $h = 13$ ft, and $m\angle F = 72°$. Find $m\angle G$. Round your answer to the nearest tenth.

a. 26.2° b. 35.9° c. 72.1° d. 32.5°

*Law of cosines x2 *① Find f. ② Find m∠G.



D 10. Which expression completes the trigonometric identity?

$\sec\left(\frac{\pi}{2} - \theta\right) =$

a. $-\cos\theta$ b. $\sin\theta$ c. $\sec\theta$ d. $\csc\theta$

Use a half-angle identity to find the exact value of the trigonometric expression.

B 11. $\cos 67.5°$ QI $= \cos\left(\frac{135°}{2}\right) = \pm\sqrt{\frac{1+\cos(135°)}{2}} = \pm\sqrt{\frac{1-\sqrt{2}/2}{2}} = \pm\sqrt{\frac{2/2-\sqrt{2}/2}{4/2}}$

a. $-\frac{\sqrt{2+\sqrt{2}}}{2}$ b. $\frac{\sqrt{2-\sqrt{2}}}{2}$ c. $-\frac{\sqrt{2-\sqrt{2}}}{2}$ d. $\frac{\sqrt{2+\sqrt{2}}}{2}$

$= +\sqrt{\frac{2-\sqrt{2}}{4}} = \frac{\sqrt{2-\sqrt{2}}}{2}$

$\sqrt{14}$ / 6 12. Given $\cos\theta = \frac{2}{9}$ A H and $0° \le \theta \le 90°$, find the exact value of $\sin\frac{\theta}{2}$.

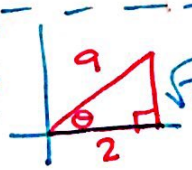
oops!

a. $\frac{\sqrt{22}}{3}$ b. $\frac{\sqrt{77}}{7}$ QI c. $\frac{\sqrt{14}}{3}$ d. $\frac{\sqrt{77}}{11}$

$\pm\sqrt{\frac{1-\cos\theta}{2}} = \pm\sqrt{\frac{1-2/9}{2}}$ (N → 11/18)

$= \sqrt{\frac{9/9-2/9}{18/9}} = \sqrt{\frac{9-2}{18}} = \sqrt{\frac{7}{18}}$ (I → N/M)

This wasn't necessary, but is a good BACKUP PLAN!!



$2^2 + x^2 = 9^2$

$4 + x^2 = 81$

$x^2 = 77$

$x = \sqrt{77}$

Solve each triangle. Round your answers to the nearest tenth.

13) In $\triangle CAB$, $b = 24.8$ m, $a = 11.7$ m, $m\angle C = 31.9°$

$\angle A = 22.6°$, $\angle B = 125.5°$, $c = 16.1$ m

14) In $\triangle QRP$, $r = 21.4$ in, $p = 16.2$ in, $m\angle Q = 97.5°$

$\angle R = 48.2°$, $\angle P = 34.3°$, $q = 28.5$ in

15) In $\triangle STR$, $t = 26$ cm, $r = 20$ cm, $m\angle S = 124°$

$\angle T = 32°$, $\angle R = 24°$, $s = 40.7$ cm

16) In $\triangle RPQ$, $m\angle R = 48.3°$, $p = 27$ cm, $q = 26$ cm

$\angle P = 68.2°$, $\angle Q = 63.5°$, $r = 21.7$ cm

17) In $\triangle BCA$, $m\angle B = 24°$, $a = 25$ in, $b = 15$ in

$\triangle$#1: $\angle C = 113.3°$, $\angle A = 42.7°$, $c = 33.9$ in

$\triangle$#2: $\angle C = 18.7°$, $\angle A = 137.3°$, $c = 11.8$ in

18) In $\triangle RST$, $m\angle R = 43°$, $t = 35$ cm, $r = 32$ cm

$\triangle$#1: $\angle S = 88.8°$, $\angle T = 48.2°$, $s = 46.9$ cm

$\triangle$#2: $\angle S = 5.2°$, $\angle T = 131.8°$, $s = 4.3$ cm

19) In $\triangle EFD$, $m\angle D = 28°$, $d = 27$ in, $f = 7$ in

$\angle E = 145°$, $\angle F = 7°$, $e = 33$ in

20) In $\triangle QRP$, $m\angle Q = 80°$, $p = 35$ in, $q = 32$ in

Not a Triangle

Use a double-angle or half-angle identity to find the exact value of each expression.

21) $\sin 15° = \sin(45° - 30°)$

$$\frac{\sqrt{6} - \sqrt{2}}{4}$$

22) $\sin 120° = \sin(2 \cdot 60°)$

$$\frac{\sqrt{3}}{2}$$

23) $\sin 112\frac{1}{2}° = \sin\left(\frac{225°}{2}\right)$

$$\frac{\sqrt{2 + \sqrt{2}}}{2}$$

24) $\sin \frac{\pi}{4} = \sin(45°)$

$$\frac{\sqrt{2}}{2}$$

25) $\sin\frac{\pi}{3}$ = sin(60°)

$\frac{\sqrt{3}}{2}$

26) $\tan\frac{5\pi}{8}$ = tan($\frac{225°}{2}$)

$-\sqrt{3+2\sqrt{2}}$

27) $\sin\theta=\frac{3}{5}$ and $0<\theta<\frac{\pi}{2}$ (QI)

Find $\cos 2\theta$

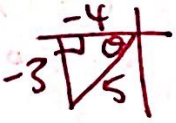
$=1-2\sin^2\theta$

$=1-2(3/5)^2$

$\frac{7}{25}$

28) $\sin\theta=-\frac{3}{5}$ and $\pi<\theta<\frac{3\pi}{2}$ (QIII)

Find $\sin 2\theta$



$=2\sin\theta\cos\theta$

$=2(-3/5)(-4/5)$

$\frac{24}{25}$

29) $\cos\theta=-\frac{15}{17}$ and $\frac{\pi}{2}<\theta<\pi$ (QII)

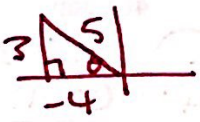
Find $\sin\frac{\theta}{2}$

$=\sqrt{\frac{1-\cos\theta}{2}}$

$=\sqrt{\frac{1-(-15/17)}{2}}$

$\frac{4\sqrt{17}}{17}$

30) $\cos\theta=-\frac{4}{5}$ and $90°<\theta<180°$ (QII)



Find $\tan 2\theta$

$=\frac{2\tan\theta}{1-\tan^2\theta}$

$=\frac{2(-3/4)}{1-(-3/4)^2}$

$\frac{-24}{7}$

31) $\sin\theta=\frac{3}{5}$ and $90°<\theta<180°$ (QII)

Find $\cos 2\theta$

$=1-2\sin^2\theta$

$=1-2(3/5)^2$

$\frac{7}{25}$

32) $\sin\theta=\frac{3}{5}$ and $0°<\theta<90°$ (QI)

Find $\tan 2\theta$

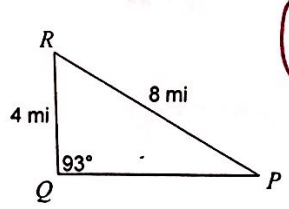
$=\frac{2\tan\theta}{1-\tan^2\theta}$

$=\frac{2(3/4)}{1-(3/4)^2}$

$\frac{24}{7}$

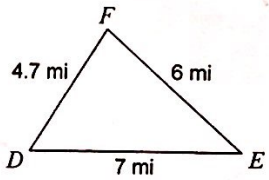
Find the area of each triangle to the nearest tenth. You may need to find some missing dimensions first!

33)



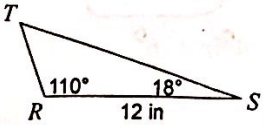
13.4 mi²

34)



13.9 mi²

35)



26.5 in²

Solve each equation for $0 \le \theta < 2\pi$.

36) $0 = \csc^2\theta + 2\cot\theta$

$0 = 1 + \cot^2\theta + 2\cot\theta$

$0 = x^2 + 2x + 1$

$0 = (x+1)(x+1)$

$\sqrt{0} = \sqrt{(\cot\theta + 1)^2} \rightarrow \cot\theta = -1$

$\theta = \frac{3\pi}{4}, \frac{7\pi}{4}$

37) $2\sin\theta + \sin\theta\sec\theta = 0$

$\sin\theta(2 + \sec\theta) = 0$

$\sin\theta = 0$

$\sec\theta = -2$

$\frac{1}{\cos\theta} = \frac{-2}{1} \rightarrow -2\cos\theta = 1$

$\cos\theta = -1/2$

$\theta = 0, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}$

38) $-3\sin\theta - \sin\theta\cos\theta = -2\sin\theta$

$-3y - yx + 2y = 0$

$-1y - yx = 0$

$-1y(1 + x) = 0$

$-\sin\theta = 0 \quad 1 + \cos\theta = 0$

$\sin\theta = 0 \quad \cos\theta = -1$

$\theta = 0, \pi$

39) $3 + \csc\theta = \csc^2\theta + 1$

$3 + x = x^2 + 1$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$\csc\theta = 2 \quad \csc\theta = -1$

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

$\sin\theta = -1$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

40) $\tan^2\theta + 1 = 2\tan\theta$

$x^2 - 2x + 1 = 0$

$(x-1)(x-1) = 0$

$\sqrt{(\tan\theta - 1)^2} = \sqrt{0}$

$\tan\theta = 1$

$\theta = \frac{\pi}{4}, \frac{5\pi}{4}$

41) $\sec^2\theta + 3 = 7$

$\sqrt{\sec^2\theta} = \pm\sqrt{4}$

$\sec\theta = \pm 2$

$\cos\theta = \pm\frac{1}{2}$

$\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

42) $-\sec^2\theta + 1 = -1$

$-\tan^2\theta - 1 + 1 = -1$

$\sqrt{\tan^2\theta} = \pm\sqrt{1}$

$\tan\theta = \pm 1$

$\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

43) $\cos^2\theta + 3 = -2\cos\theta + 2$

$x^2 + 3 = -2x + 2$

$x^2 + 2x + 1 = 0$

$\sqrt{(\cos\theta + 1)^2} = \sqrt{0}$

$\cos\theta = -1$

$\theta = \pi$

Find the exact value of each. Make your life easier!! Search for the identities being used!

★ 44) $\sin\frac{17\pi}{18}\cos\frac{4\pi}{9} - \cos\frac{17\pi}{18}\sin\frac{4\pi}{9}$

$\sin\left(\frac{17\pi}{18} - \frac{4\pi}{9}\right)$

$= \sin(\pi/2) = 1$

45) $\cos 57^\circ\cos 3^\circ - \sin 57^\circ\sin 3^\circ$

$\cos(57^\circ + 3^\circ)$

$\cos(60^\circ) = \frac{1}{2}$

46) $\dfrac{\tan 36^\circ + \tan 144^\circ}{1 - \tan 36^\circ\tan 144^\circ}$

$\tan(36^\circ + 144^\circ)$

$= \tan(180^\circ)$

$= 0$

★ 47) $\dfrac{\tan\frac{2\pi}{9} - \tan\frac{\pi}{18}}{1 + \tan\frac{2\pi}{9}\tan\frac{\pi}{18}}$

$\tan\left(\frac{2\pi}{9} - \frac{\pi}{18}\right)$

$\tan(\pi/6) = \sqrt{3}/3$

★ 48) $\sin\frac{5\pi}{9}\cos\frac{\pi}{18} - \cos\frac{5\pi}{9}\sin\frac{\pi}{18}$

$\sin\left(\frac{5\pi}{9} - \frac{\pi}{18}\right)$

$= \sin(\pi/2) = 1$

49) $\sin 124^\circ\cos 116^\circ + \cos 124^\circ\sin 116^\circ$

$\sin(124^\circ + 116^\circ)$

$\sin(240^\circ)$

$= -\frac{\sqrt{3}}{2}$