

Algebra 2 - Assignment 51 Key

NEW

Find θ in radians:

1. $\sin \theta = 0$

$\theta = 0, \pi$

2. $\cos \theta = \frac{\sqrt{3}}{2}$

$\theta = \frac{\pi}{6}, \frac{11\pi}{6}$

3. $\sin \theta = -\frac{\sqrt{2}}{2}$

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

4. $\tan \theta = 1$

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

5. $\tan \theta = \sqrt{3}$

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

Find θ in degrees:

6. $\tan \theta = 0$

$\theta = 0^\circ, 180^\circ$

7. $\sin \theta = \frac{\sqrt{2}}{2}$

$\theta = 45^\circ, 135^\circ$

8. $\cos \theta = -\frac{\sqrt{3}}{2}$

$\theta = 150^\circ, 210^\circ$

9. $\sin \theta = 1$

$\theta = 90^\circ$

10. $\tan \theta = -\frac{\sqrt{3}}{3}$

$\theta = 150^\circ, 330^\circ$

Find θ in radians. Use calculator, round to 4 decimals.

11. $\cos \theta = \frac{7}{8}$

$\theta = \cos^{-1}(\frac{7}{8}) = .5054$

12. $\sin \theta = \frac{2}{5}$

$\theta = \sin^{-1}(\frac{2}{5}) = .4115$

13. $\tan \theta = 23$

$\theta = \tan^{-1}(23) = 1.5273$

REVIEW

14. Factor: $5xy - 3y + 10x - 6$
 $= y(5x-3) + 2(5x-3) = \boxed{(5x-3)(y+2)}$

15. Simplify: $\sqrt[4]{-32} = \boxed{4i\sqrt{2}}$

16. Find the inverse: $f(x) = e^{2x}$
 $y = e^{2x} \rightarrow x = e^{2y} \rightarrow \ln(x) = 2y \ln(e) \rightarrow \ln(x) = 2y$
 $\rightarrow y = \frac{\ln(x)}{2} \rightarrow \boxed{f^{-1}(x) = \frac{\ln(x)}{2}}$

17. $2[\ln x - \ln(x+1) - \ln(x-1)]$
 $= 2\ln x - 2\ln(x+1) - 2\ln(x-1) = \boxed{\ln \left(\frac{x^2}{(x+1)^2(x-1)^2} \right)}$

18. $\log_2(x^2-9) = 4$
 $x^2-9 = 2^4 \rightarrow x^2-9 = 16 \rightarrow \sqrt{x^2} = \sqrt{25} \rightarrow \boxed{x = \pm 5}$

19. $\log_9(x+4) + \log_9(x-4) = 1$
 $\log_9[(x+4)(x-4)] = 1 \rightarrow x^2-16 = 9 \rightarrow x^2 = 25 \quad x = \pm 5$
 but $x \neq -5$, so $\boxed{x = 5}$

20. $\log_2(x+5) - \log_2(x-2) = 3 \rightarrow \frac{x+5}{x-2} = 2^3 \rightarrow x+5 = 8(x-2)$
 $\rightarrow x+5 = 8x-16 \rightarrow 21 = 7x \rightarrow \boxed{x = 3}$

21. $\log x + \log(x-1) = \log 4x \rightarrow \log[x(x-1)] = \log 4x$
 $\rightarrow x^2-x = 4x \rightarrow x^2-5x = 0 \rightarrow x(x-5) = 0$
 $x \neq 0, x-5 = 0 \rightarrow \boxed{x = 5}$

22. $\sin \theta = \frac{\sqrt{3}}{2}$ $\boxed{\cos \theta = \frac{1}{2}}$ $\tan \theta = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$
 $\boxed{\tan \theta = \sqrt{3}}$

23. $\log_5(53) = \frac{\log 53}{\log 5} = \boxed{2.467}$

24. $9^x = 45 \rightarrow \log_9 45 = x \rightarrow \boxed{x = \frac{\ln 45}{\ln 9} = 1.732}$

25. $500e^{-x} = 300 \rightarrow e^{-x} = 300/500 \rightarrow e^{-x} = 3/5$
 $\rightarrow \ln(3/5) = -x \rightarrow x = -\ln(3/5) = \boxed{.511}$

26. How many years will it take a sum of money to double if it is invested at 7% interest?

$t = ?$ $r = 7\% = .07$ $p = x$ $y = 2x$
 $\frac{2x}{x} = \frac{x e^{.07t}}{x} \rightarrow 2 = e^{.07t} \rightarrow \ln 2 = .07t$
 $t = \frac{\ln 2}{.07} = \boxed{9.90 \text{ years}}$

27. At what annual rate will a sum of money triple in 12 years?

$y = 3x$, $p = x$, $r = ?$, $t = 12$
 $3x = x e^{12r} \rightarrow 3 = e^{12r} \rightarrow \ln 3 = 12r \rightarrow r = \frac{\ln 3}{12} = \boxed{.0916}$
 $\boxed{9.16\%}$

28. Radium has a 1/2-life of 1620 years. A 20g. sample is in a box.

(x2) a) $t = 5000$ $r = -\ln 2 / 1620 = -.0004279$
 $y = 20 e^{(-.0004279 * 5000)} = \boxed{2.35 \text{ grams}}$

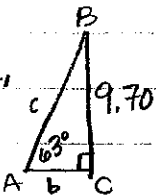
b) $y = 5g$
 $5 = 20 e^{(-\ln 2 / 1620 * t)} \rightarrow .25 = e^{(-\ln 2 / 1620 * t)}$
 $\rightarrow \frac{\ln(.25)}{(-\ln 2 / 1620)} = t \rightarrow \boxed{t = 3240 \text{ years}}$

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8. $\sin 42 = \frac{x}{39} \rightarrow x = 39 \cdot \sin 42$
 $\boxed{x = 26.1}$

10. $\sin x = 0.7364 \rightarrow x = \sin^{-1}(0.7364) = \boxed{47^\circ}$

(x2) 12.



$$\sin 63 = \frac{9.70}{c}$$

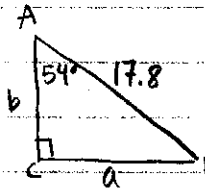
$$c = \frac{9.70}{\sin 63} = 10.9$$

$$\tan 63 = \frac{9.7}{b}$$

$$b = \frac{9.7}{\tan 63} = 4.9$$

$\angle A = 63^\circ$	$a = 9.70$
$\angle B = 27^\circ$	$b = 10.9$
$\angle C = 90^\circ$	$c = 4.9$

(x2) 14.



$$\sin 54 = \frac{a}{17.8}$$

$$17.8 \cdot \sin 54 = a, \quad a = 14.4$$

$$\cos 54 = \frac{b}{17.8}$$

$$b = 17.8(\cos 54) = 10.5$$

$\angle A = 54^\circ$	$a = 14.4$
$\angle B = 36^\circ$	$b = 10.5$
$\angle C = 90^\circ$	$c = 17.8$

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16. -60°

$$-60 + 360 = 300^\circ$$

$$-60 - 360 = -420^\circ$$

18. 750°

$$750 - 360 = 390 - 360 = 30^\circ \quad (\text{or } 390^\circ)$$

$$30^\circ - 360 = -330^\circ$$

20. $-\frac{90^\circ \cdot \pi}{180} = -\frac{\pi}{2}$ radians

22. $\frac{135^\circ \cdot \pi}{180} = \frac{27\pi}{36} = \frac{3\pi}{4}$ radians

34. $\frac{5\pi \cdot 180^\circ}{2 \cdot \pi} = 450^\circ$