

34.

$$\log_x 2 = 5$$

$$x^5 = 2$$

$$(x^5)^{\frac{1}{5}} = (2)^{\frac{1}{5}}$$

D

$$x = \sqrt[5]{2}$$

$$x \approx 1.1487$$

35.

$$\frac{\log_5\left(\frac{1}{8}\right)}{\log_5(2)} = \log_2\left(\frac{1}{8}\right) = \log_2(2^{-3}) = -3$$

36.

$$3^{x-5} = 4$$

$$\log 3^{x-5} = \log 4$$

$$(x-5)\log 3 = \log 4$$

C

$$x-5 = \frac{\log 4}{\log 3}$$

$$x = \frac{\log 4}{\log 3} + 5$$

37.

$$\log_3 \sqrt{2x+3} = 2$$

$$3^2 = \sqrt{2x+3}$$

$$\sqrt{2x+3} = 9$$

C

$$(\sqrt{2x+3})^2 = (9)^2$$

$$\text{Check: } \sqrt{2(39)+3} = 9$$

$$2x+3 = 81$$

$$9 = 9$$

$$2x = 78$$

$$\text{Check: } \log_3 \sqrt{2(39)+3} = 2$$

$$x = 39$$

$$3^2 = \sqrt{81}$$

38.

$$\log_3 m = 8$$

$$\log_3 \left(\frac{\sqrt{mn}}{p^3} \right) = \log_3 (mn)^{\frac{1}{2}} - \log_3 p^3$$

$$\log_3 n = 10 \Rightarrow = \log_3 \left(m^{\frac{1}{2}} n^{\frac{1}{2}} \right) - \log_3 p^3$$

A

$$\log_3 p = 6 = \log_3 m^{\frac{1}{2}} + \log_3 n^{\frac{1}{2}} - \log_3 p^3$$

$$= \frac{1}{2} \log_3 m + \frac{1}{2} \log_3 n - 3 \log_3 p$$

$$= \frac{1}{2}(8) + \frac{1}{2}(10) - 3(6)$$

$$= 4 + 5 - 18 = -9$$

39. Half-life means when half of the initial amount still remains, $\frac{1}{2}q_o$.

$$\frac{1}{2}q_o = q_o e^{-0.0063t}$$

$$\frac{1}{2} = e^{-0.0063t}$$

$$\ln\left(\frac{1}{2}\right) = \ln\left(e^{-0.0063t}\right)$$

$$\ln\left(\frac{1}{2}\right) = -0.0063t$$

$$\frac{\ln(0.5)}{-0.0063} = t \approx 110.0 \text{ days}$$

40.

$$y = 2 + 2^x$$

$$\text{When } x = 0, y = 2 + 2^0$$

D

$$y = 2 + 1 = 3$$

41.

$$\begin{cases} x + 4y = 3 \\ 2x - 6y = 8 \end{cases} \Rightarrow x = 3 - 4y$$

$$2(3 - 4y) - 6y = 8$$

$$6 - 8y - 6y = 8$$

$$y = \frac{2}{-14} = -\frac{1}{7} \Rightarrow x = 3 - 4\left(-\frac{1}{7}\right) = \frac{25}{7}$$

$$\left(\frac{25}{7}, -\frac{1}{7}\right)$$

42.

$$\begin{cases} x^2 + y^2 = 16 \\ 2y - x = 4 \Rightarrow x = 2y - 4 \end{cases}$$

$$(2y - 4)^2 + y^2 = 16$$

$$4y^2 - 16y + 16 + y^2 = 16$$

$$5y^2 - 16y = 0$$

$$y(5y - 16) = 0$$

$$y = 0 \Rightarrow x = 2(0) - 4 = -4$$

$$y = \frac{16}{5} \Rightarrow x = 2\left(\frac{16}{5}\right) - 4 = \frac{12}{5}$$

$$(-4, 0) \& \left(\frac{12}{5}, \frac{16}{5}\right)$$

43.

$$\begin{cases} x + y - z = -1 \Rightarrow x = -y + z - 1 \\ 4x - 3y + 2z = 16 \\ 2x - 2y - 3z = 5 \end{cases}$$

$$\begin{cases} 4(-y + z - 1) - 3y + 2z = 16 \\ 2(-y + z - 1) - 2y - 3z = 5 \end{cases}$$

$$\begin{cases} -7y + 6z - 4 = 16 \\ -4y - z - 2 = 5 \end{cases}$$

$$\begin{cases} -7y + 6z = 20 \\ -4y - z = 7 \Rightarrow z = -4y - 7 \end{cases}$$

$$-7y + 6(-4y - 7) = 20$$

$$-31y = 62$$

$$y = -2$$

$$y = -2 \Rightarrow z = -4(-2) - 7$$

$$z = 1$$

44.

$$\begin{array}{r} x^2 + 6x + 34 \\ x^2 - 6x + 0 \overline{) x^4 + 0x^3 - 2x^2 + 0x - 3} \\ + (-x^4 + 6x^3 + 0x^2) \end{array}$$

$$\begin{array}{r} 6x^3 - 2x^2 + 0x \\ + (-6x^3 + 36x^2 + 0x) \end{array} \quad \mathbf{C}$$

$$\begin{array}{r} 34x^2 + 0x - 3 \\ + (-34x^2 + 204x + 0) \end{array}$$

$$q(x) = x^2 + 6x + 34$$

$$r(x) = 204x - 3$$

$$204x - 3$$

45. If the denominator of the function is equal to zero the function will be undefined.

$$f(x) = \frac{(x+3)(x-3)}{x(x+2)}$$

when $x = 0$ or $x = -2$

46.

$$y = x^2(x-1)(x+1)^2$$

$$x - \text{intercepts: } x^2(x-1)(x+1)^2 = 0$$

$$x = 0, x = 1, x = -1$$

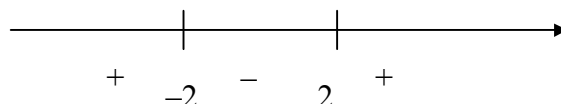
A

Interval	$(-\infty, -1)$	$(-1, 0)$	$(0, 1)$	$(1, \infty)$
x^2	+	+	+	+
$x - 1$	-	-	-	+
$(x + 1)^2$	+	+	+	+
Result	-	-	-	+
	below	below	below	above
	x - axis	x - axis	x - axis	x - axis

47.

$$x = 2 \Rightarrow x - \text{intercept}$$

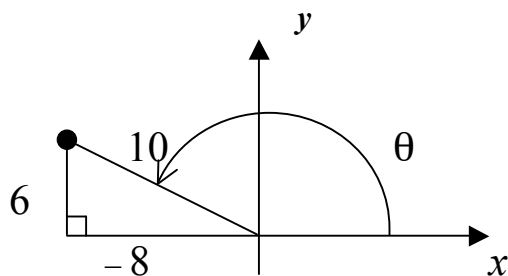
$$x = -2 \Rightarrow \text{vertical asymptote}$$



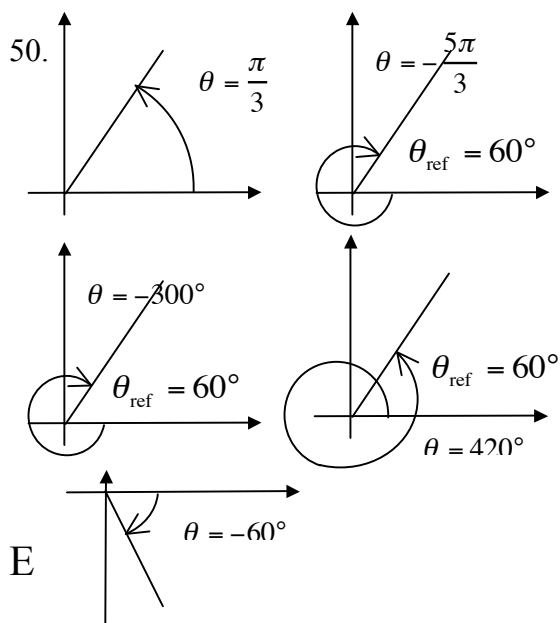
E is the closest answer. The scale is a bit off on the x-axis.

48. Shifted left 1 unit, then reflected about x-axis, then shifted down 2 units -- Answer: C

49.



$$\begin{aligned}\sin \theta &= \frac{6}{10} = \frac{y}{r} \\ x^2 + y^2 &= r^2 \\ x^2 + 6^2 &= 10^2 \\ x^2 &= 64 \\ x &= \pm 8 \\ x &= -8 \\ \cos \theta &= \frac{x}{r} = \frac{-8}{10} = -0.8\end{aligned}$$



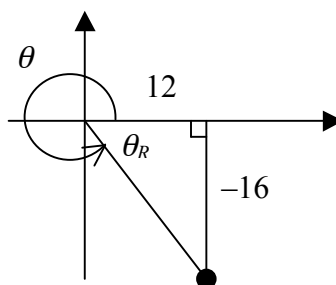
51.

$$135^\circ \cdot \frac{\pi \text{ radians}}{180^\circ} = \frac{3\pi}{4}$$

52.

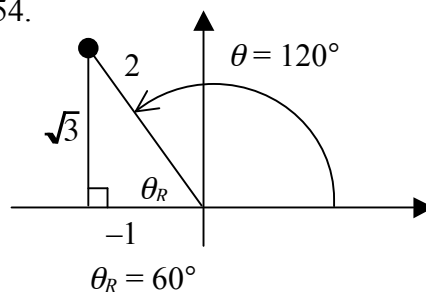
$$\sec 126^\circ = \frac{1}{\cos 126^\circ} \approx \frac{1}{-0.587785} \approx -1.7013$$

53.



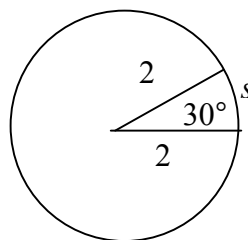
$$\tan \theta = \frac{y}{x} = \frac{-16}{12} = -\frac{4}{3}$$

54.



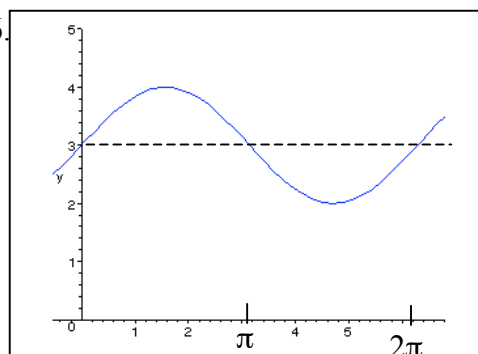
$$\tan \theta = \frac{y}{x} = \frac{\sqrt{3}}{-1} = -\sqrt{3}$$

55.



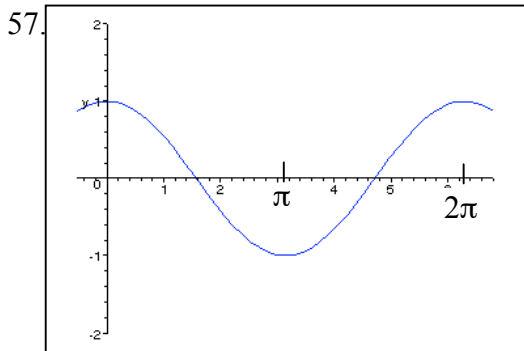
$$s = r\theta = 2\left(\frac{\pi}{6}\right) = \frac{\pi}{3} \approx 1.047$$

56.



The graph is the $y = \sin x$ shifted up three units.

I(yes), II(no), III(yes), IV(yes), **B**



$D = \text{all real number} = (-\infty, \infty)$

$R = \text{all possible outputs/y-values} = [-1, 1]$

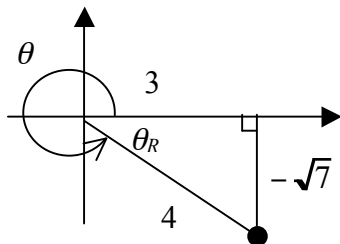
58.

59.

$$\frac{\tan x \cdot \cos x \cdot \csc x}{\cot x \cdot \sec x \cdot \sin x} = \frac{\tan x \cdot \tan x \cdot \cos x \cdot \cos x}{\sin x \cdot \sin x}$$

$$= \frac{\tan^2 x \cdot \cos^2 x}{\sin^2 x} = \frac{\sin^2 x}{\cos^2 x} \cdot \frac{\cos^2 x}{\sin^2 x} = 1$$

60.



$$x^2 + y^2 = r^2$$

$$y^2 = 4^2 - 3^2$$

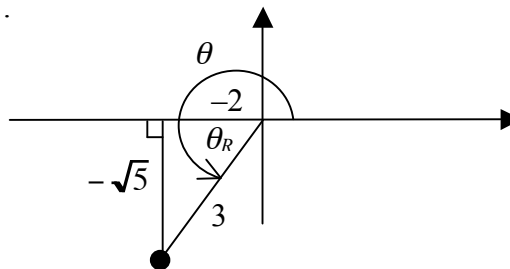
$$y = \pm \sqrt{7}$$

$$y = -\sqrt{7}$$

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

$$= 2 \left(\frac{-\sqrt{7}}{4} \right) \left(\frac{3}{4} \right) = -\frac{3\sqrt{7}}{8}$$

61.



Given : $\tan \theta = \frac{\sqrt{5}}{2} = \frac{-\sqrt{5}}{-2} = \frac{y}{x} \uparrow$

$\frac{\theta}{2}$ is in QII, $\cos\left(\frac{\theta}{2}\right) = \pm \sqrt{\frac{1 + \cos \theta}{2}}$

$\cos\left(\frac{\theta}{2}\right) = -\sqrt{\frac{1 + \left(\frac{-2}{3}\right)}{2}} = -\sqrt{\frac{1 - \frac{2}{3}}{2}}$

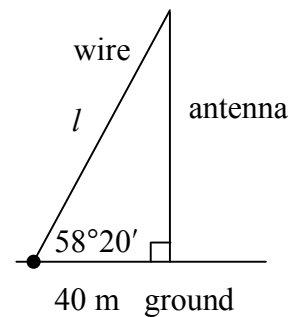
62.

$$\cos 58.3^\circ = \frac{40}{l}$$

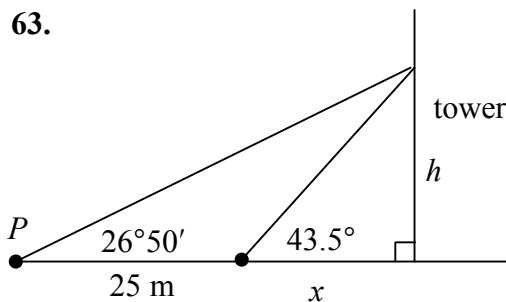
$$l \cdot \cos 58.3^\circ = 40$$

$$l = \frac{40}{\cos 58.3^\circ}$$

$$l \approx 76.2 \text{ m}$$



63.



$$\tan 43.5^\circ = \frac{h}{x}, \quad \tan 26.83^\circ = \frac{h}{x + 25}$$

$$h = x \cdot \tan 43.5^\circ$$

$$\tan 26.83^\circ = \frac{x \cdot \tan 43.5^\circ}{x + 25}$$

$$\tan 26.83^\circ (x + 25) = x \cdot \tan 43.5^\circ$$

$$x \tan 26.83^\circ + 25 \tan 26.83^\circ = x \cdot \tan 43.5^\circ$$

$$25 \tan 26.83^\circ = x \cdot \tan 43.5^\circ - x \tan 26.83^\circ$$

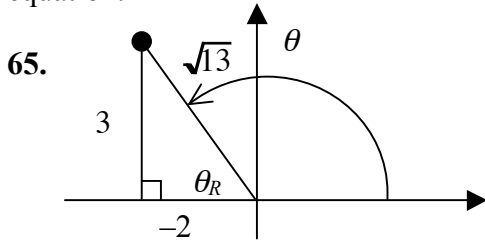
$$x = \frac{25 \tan 26.83^\circ}{\tan 43.5^\circ - \tan 26.83^\circ} \approx 28.541487$$

$$h = x \cdot \tan 43.5^\circ \approx 27.1 \text{ meters}$$

64. Examine r when $\theta = 0$ and as $\theta \rightarrow 90^\circ$

- A. $r = 1$ when $\theta = 0$ and as $\theta \rightarrow 90^\circ$ $r \rightarrow 2$, looks right as the angle changes from 0° to 90° .
- B. $r = 2$ when $\theta = 0$ and as $\theta \rightarrow 90^\circ$ $r \rightarrow 1$, looks incorrect as the angle changes from 0° to 90° .
The radial distance should be getting bigger.
- C. $r = 1$ when $\theta = 0$ and as $\theta \rightarrow 90^\circ$ $r \rightarrow 0$, looks incorrect as the angle changes from 0° to 90° .
The radial distance should be getting bigger.
- D. $r = 2$ when $\theta = 0$ and as $\theta \rightarrow 90^\circ$ $r \rightarrow 0$, looks incorrect as the angle changes from 0° to 90° .
The radial distance should be getting bigger.
- E. $r = 0$ when $\theta = 0$ and as $\theta \rightarrow 90^\circ$ $r \rightarrow 2$, looks incorrect as the angle changes from 0° to 90° .
When the angle is zero the radial distance should be greater than zero.

Plugging in further angles would yield more points that will confirm that **A** is the correct polar equation.



$$r^2 = (-2)^2 + 3^2$$

$$r = \sqrt{13}$$

$$\tan \theta = \frac{y}{x} = \frac{3}{-2} \Rightarrow \tan^{-1}\left(-\frac{3}{2}\right) \approx -56.301^\circ$$

$$\theta_R = +56.301^\circ$$

$$\theta = 180^\circ - \theta_R \approx 123.7^\circ$$

$$(\sqrt{13}, 123.7^\circ)$$

66.

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

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

$$r^2 - 2r \cos \theta = 0$$

$$r(r - 2 \cos \theta) = 0$$

$r = 0$, which is not an equation of the given circle

or $r = 2 \cos \theta$