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Pre-Calculus 12
Final Exam Multiple Choice and Numerical Response

Record your answers on the sheet provided.

1. Which of the following best describes the difference between the graphs of $y = x^2$ and $y = x^2 - 4$?

A Compared to the graph of $y = x^2$, the graph of $y = x^2 - 4$ is shifted 4 units to the left.
B Compared to the graph of $y = x^2$, the graph of $y = x^2 - 4$ is shifted 4 units to the right.
C Compared to the graph of $y = x^2$, the graph of $y = x^2 - 4$ is shifted 4 units up.
D Compared to the graph of $y = x^2$, the graph of $y = x^2 - 4$ is shifted 4 units down.

2. Which of the following best describes the difference between the graphs of $y - 2 = x^2$ and $y = x^2$?

A Compared to the graph of $y = x^2$, the graph of $y - 2 = x^2$ is shifted 2 units to the left.
B Compared to the graph of $y = x^2$, the graph of $y - 2 = x^2$ is shifted 2 units to the right.
C Compared to the graph of $y = x^2$, the graph of $y - 2 = x^2$ is shifted 2 units up.
D Compared to the graph of $y = x^2$, the graph of $y - 2 = x^2$ is shifted 2 units down.

3. Compared to the graph of $y = f(x)$, what are the effects of the values of a and b on the graph of $y = 2f(3x)$?

A The value 2 is a vertical stretch factor and the value 3 indicates a horizontal stretch by a factor of $\frac{1}{3}$.
B The value 2 translates the graph 2 units up and the value 3 increases y by a factor of 3.
C The value 2 is a horizontal stretch and the value 3 is a vertical stretch.
D The net effect is an increase in the y-coordinates by a factor of 6.

4. Which of the following is true about the relation $y = 5x - 2$ and its inverse?

A Both the relation and its inverse are functions.
B The relation is a function, but the inverse is not.
C Neither of the relations are functions.
D The relation is not a function, but its inverse is.

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5. Which is true of the following two functions, $y = 2x + 1$ and $y = \frac{(x-1)}{2}$?

A They are both functions. One is an inverse of the other.
B They are both relations but not functions.
C One is an inverse relation, but is not a function.
D They are reflections about the *x*-axis.

6. Which of the following best describes the reflection of a graph?

A A reflection is a change in the shape of the graph around either the *x*- or *y*-axis.
B A reflection is an enlargement or reduction of the graph but does not change the orientation of the graph.
C A reflection is a mirror image of the graph as translated through the *y*-axis.
D A reflection creates a mirror image of the graph in the line of reflection. Reflections do not change the shape of the graph, but they may change the orientation of the graph.

7. Which of the following exponential forms is equal to the logarithmic form $\log_c x = y$?

A $y^c = cx$ **B** $c^y = x$ **C** $x^y = c$ **D** $c = \frac{x}{y}$

8. Which of the logarithms have a value of 0?

A $\log_5 1$ **B** $\log_0 2$ **C** $\log_2 -2$ **D** $\log_1 \frac{1}{2}$

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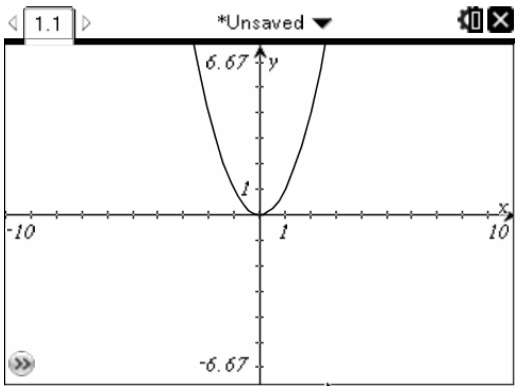
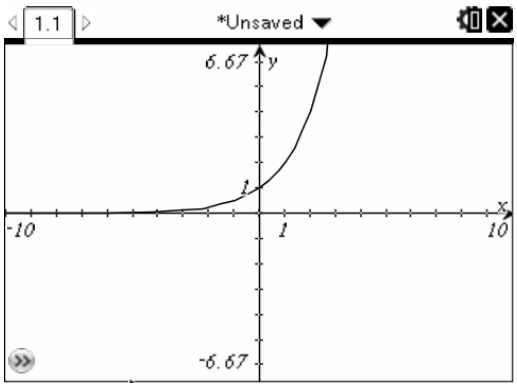
9. Which of the following is a sketch of the graph of $y = 2^x$?

A



B



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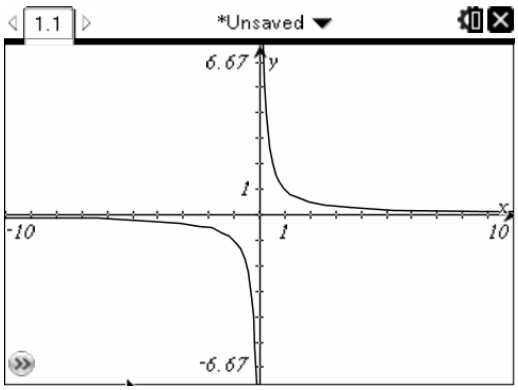

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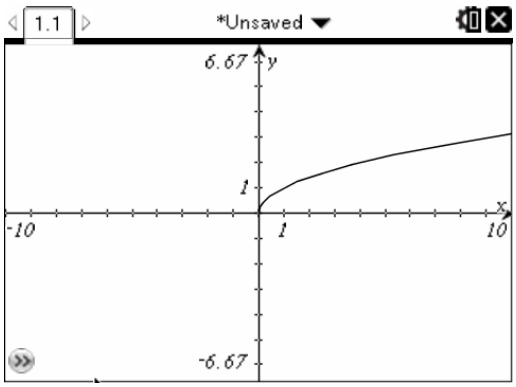

10. Consider the graph of the function $y = \sqrt{x}$. Which of the tables is an appropriate representation of the function?

A

x	*y*
–2	–1
–1	0
0	1
1	2

B

x	*y*
0	0
1	1
2	4
3	9

C

x	*y*
0	0
1	1
4	2
9	3

D

x	*y*
0	0
1	1
2	4
3	9

11. What is the domain and range of the function $y = \sqrt{x}$?

A The domain is $\{ x \mid x \geq 0, x \in \mathrm{R} \}$, the range is $\{ y \mid y \geq 0, y \in \mathrm{R} \}$.

B The domain is $\{ x \mid x \geq 1, x \in \mathrm{R} \}$, the range is $\{ y \mid y \geq 1, y \in \mathrm{R} \}$.

C The domain is $\{ x \mid x > 0, x \in \mathrm{R} \}$, the range is $\{ y \mid y > 0, y \in \mathrm{R} \}$.

D The domain is $\{ x \mid x \leq 0, x \in \mathrm{R} \}$, the range is $\{ y \mid y \leq 0, y \in \mathrm{R} \}$.

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12. Consider the graph of the function $y-k=a\sqrt{(b(x-h))}$. Which of the following best describes how to apply transformations to $y=\sqrt{x}$ in order to sketch the graph?

A The value *a* results in a horizontal stretch by a factor of |*a*|. If $a < 0$, the graph is reflected in the *x*-axis.

The value *b* results in a vertical stretch by a factor of $\frac{1}{|b|}$. If $b < 0$, the graph is reflected in the *y*-axis.

The value *h* translates the graph horizontally to the right if positive, and to the left if negative.

The value *k* translates the graph vertically. If $k > 0$, the graph translates *k* units up. If $k < 0$, the graph translates |*k*| units down.

B The value *a* results in a vertical stretch by a factor of |*a*|. If $a < 0$, the graph is reflected in the *y*-axis.

The value *b* results in a horizontal stretch by a factor of $\frac{1}{|b|}$. If $b < 0$, the graph is reflected in the *x*-axis.

The value *h* translates the graph horizontally to the right if positive, and to the left if negative.

The value *k* translates the graph vertically. If $k > 0$, the graph translates *k* units up. If $k < 0$, the graph translates |*k*| units down.

C The value *a* results in a vertical stretch by a factor of |*a*|. If $a < 0$, the graph is reflected in the *x*-axis.

The value *b* results in a horizontal stretch by a factor of $\frac{1}{|b|}$. If $b < 0$, the graph is reflected in the *y*-axis.

The value *h* translates the graph horizontally to the right if positive, and to the left if negative.

The value *k* translates the graph vertically. If $k > 0$, the graph translates *k* units up. If $k < 0$, the graph translates |*k*| units down.

D The value *a* results in a vertical stretch by a factor of *a*. If $a < 0$, the graph is reflected in the *x*-axis.

The value *b* results in a horizontal stretch by a factor of $\frac{1}{b}$. If $b < 0$, the graph is reflected in the *y*-axis.

The value *h* translates the graph horizontally to the right if positive, and to the left if negative.

The value *k* translates the graph vertically. If $k > 0$, the graph translates *k* units up. If $k < 0$, the graph translates |*k*| units down.

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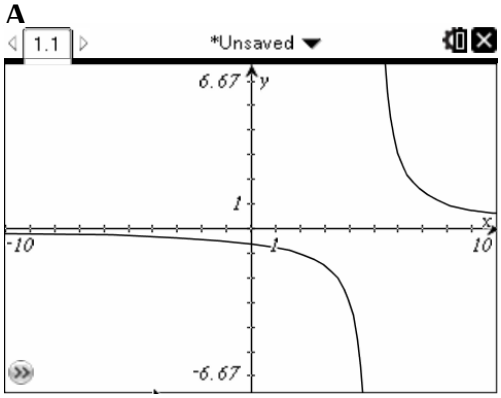
13. Which of the following is a graph of the function $y = \frac{5}{(x-3)}$?

A



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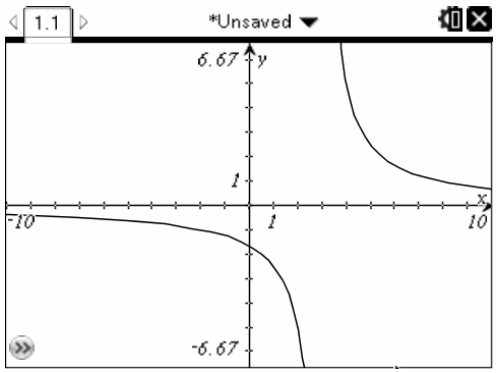

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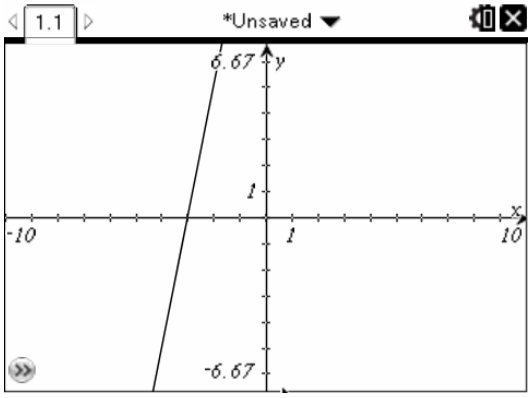
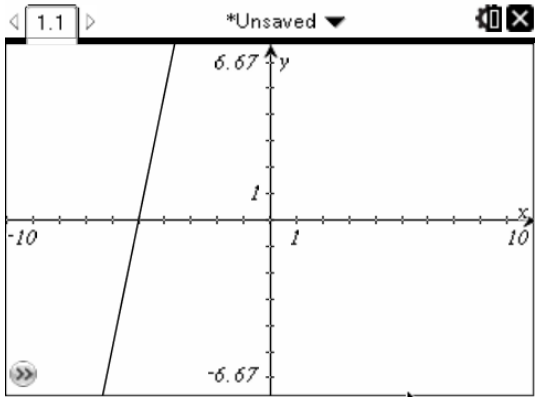


D



14. If $f(x) = x^2$ and $g(x) = x + 1$, and $h(x) = f(x) + g(x)$, which of the following is $h(x)$?

A $x^3 + x^2$ **B** $x^2 + x + 1$ **C** x **D** undefined

15. Which of the following is a vertical translation of $y = 2x + 1$?

A $y = x^2 + 1$ **B** $y = 3x + 1$ **C** $y = \frac{1}{2}x + 1$ **D** $y = 2x + 2$

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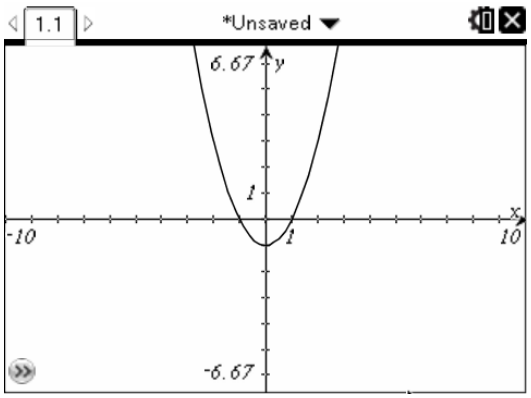
16. Which is the graph of $f(x) = x(x - 1)$?

A



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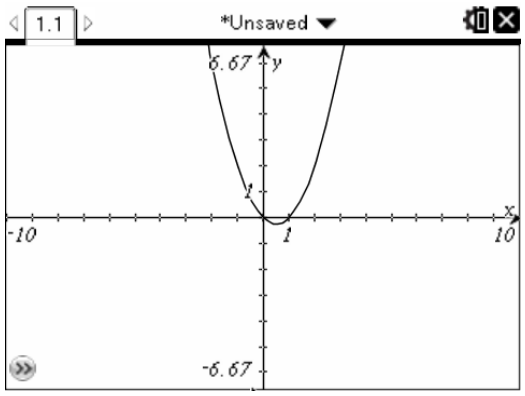
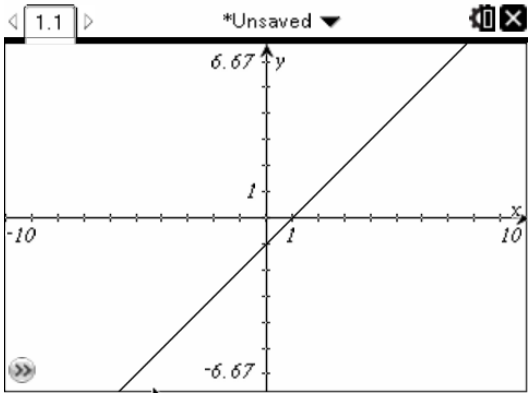


C



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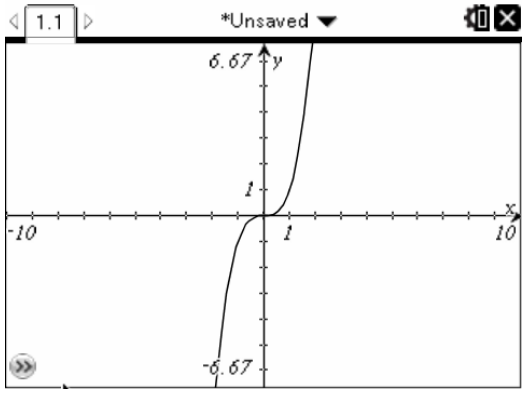

17. Which of the following is a necessary strategy in order to graph a radical function?

A Plot three points from a table of values and then draw the line of best fit.

B Set x as –1, 0 and +1, find y and then draw the graph.

C Find the domain using an inequality.

D Check to see if it is a function by setting x less than zero.

18. Which of the following explains the difference between $y = \sqrt{f(x)}$ and $y = f(x)$?

A The radical function has a restricted domain.

B Only one function can contain irrational numbers.

C $f(x)$ must be linear.

D $f(x)$ cannot be x^2.

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19. If $f(x)=\dfrac{(x^2-5x+6)}{(x-3)}$, which of the following are true?

A The graph is the same as the graph of $y = x - 2$.
B There is an asymptote at $x = 3$
C There is a hole in the graph at (3, 1).
D There is a hole in the graph at (3, 0).

20. Suppose $\dfrac{4}{x}=\dfrac{9}{(x-2)}$. If $f(x)=\dfrac{4}{x}$ and $g(x)=\dfrac{9}{(x-2)}$, which of the following is true?

A The intersection of the *y*-axis and the functions is the solution to the equation.
B An approximate solution to the equation can be found at the intersection of $f(x)$ and $g(x)$.
C There is no solution to the equation because when $x = 2$, $g(x)$ is undefined.
D Solving algebraically produces an accurate, but still approximate solution.

21. An ice cream shop has 16 flavours of ice cream, two types of cones, three sizes of each type of cone and offers free sprinkles to those who likes them. How many possible combinations are possible of flavour, cone type, cone size, and having sprinkles or not?

A 21 **B** 42 **C** 96 **D** 192

22. If five students in class were racing to sit in three chairs, in how many different ways could those students occupy those chairs?

A 1 **B** 8 **C** 15 **D** 60

23. Which of the following is a permutation problem?

A Find all the ways in which the letters that spell *cat* can be arranged.
B How many ways can three people sit in two seats?
C What are the chances of randomly picking first, second, and third place in a 100-m dash if there are five runners?
D What are the chances of selecting four cards of different suites from the top of a shuffled deck of regular playing cards?

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24. Which of the following is the third term in the expansion of $(4b - 5)^6$?

A $4b^6 - 5^6$ **B** $96000b^4$ **C** $16b^6 - 20b^3 + 15625$ **D** $16b^{12} - 15625$

25. Consider the function $f(x) = 3 \sin x + 4$. Which of the following is true for that function?

A The amplitude is 3. The vertical displacement is 4. The period is 2π.

B The amplitude is 3. The vertical displacement is 4. The period is π.

C The amplitude is 4. The vertical displacement is 3. The period is 2π.

D The amplitude is 4. The vertical displacement is 3. The period is 2π.

26. Consider $y = a \sin x$ and $y = a \cos x$. Which is true about the effect of changing the value of a?

A Changing the value of a changes the amplitude of $y = a \sin x$ and changes the period of $y = a \cos x$.

B Changing the value of a changes the amplitude of $y = a \cos x$ and changes the period of $y = a \sin x$.

C Changing the value of a changes the amplitude of both graphs.

D Changing the value of a changes the period of both graphs.

27. Consider $y = \cos (x + c)$ and $y = \sin (x + c)$. Assume c is a positive integer. How does changing the value of c change the graph?

A Changing the value of c increases the amplitude of both graphs.

B Changing the value of c changes the period of both graphs.

C Changing the value of c shifts both graphs to the right.

D Changing the value of c shifts both graphs to the left.

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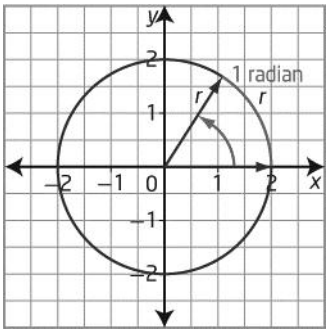
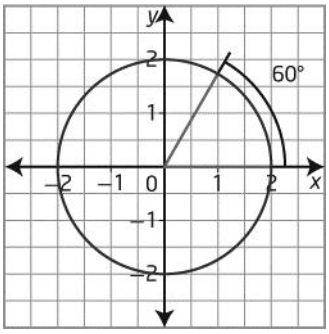
28. Which of the following is the sketch of an angle in standard position with an angle of 1 radian?

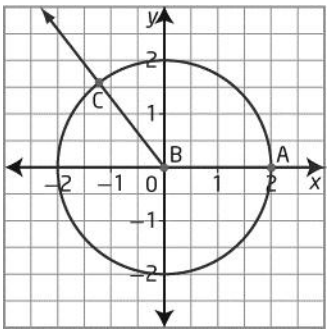
A



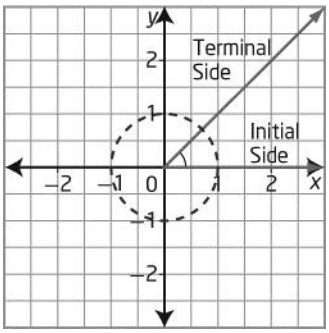
B



C



D



29. Which of the following is the angle $\frac{5\pi}{4}$ radians as measured in degrees?

A 225° **B** 125° **C** 3.92° **D** 225°

30. Consider the equation $\cos x = 0.35$. Which of the following is a solution to four decimal places?

A 1.2132 **B** 0.8660 **C** 3.2116 **D** 0.1750

31. Solve the equation $5 \sin \theta + 2 = 1 + 3 \sin \theta$, $0 \leq \theta \leq 2\pi$, in the specified domain.

A $\frac{2\theta}{0.32}$ and 0.326

B 0.326 and $\frac{\pi}{5}$

C $\frac{7\pi}{6}$ and $\frac{11\pi}{6}$

D 0.326 and 2.816

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32. Which of the following explains the difference between a trigonometric identity and a trigonometric equation?

A An identity must be written in radian units whereas an equation can be in degrees or radians.

B Identities are true for any value of the variable and an equation has specific correct values for the solution to the equation.

C An identity can be replaced with an equation but an equation cannot be replaced with an identity.

D An identify cannot be used to solve an equation.

33. Use technology to graph $\sin x$ and $\sin(\pi - x)$ on the same set of axes. Which of the following is the most appropriate conclusion to draw from the results you observe?

A $\sin x$ and $\sin(\pi - x)$ cannot be graphed on the same axes.

B $\sin x$ and $\sin(\pi - x)$ are double inverse functions.

C $\sin x$ and $\sin(\pi - x)$ are separated too widely to graph on the same axes.

D $\sin x$ and $\sin(\pi - x)$ are identities.

34. Which of the following are non-permissible values for the identity $\tan x = \frac{\sin x}{\cos x}$?

A $\pi, 2\pi, 3\pi$

B $\frac{\pi}{2}, \frac{-\pi}{2}, \frac{5\pi}{2}$

C any multiple of π

D any multiple of 2π

35. If $P(\theta) = (x, y)$ is the point on the terminal arm of angle θ that intersects the unit circle, which of the following are true?

A $\cos\theta = y$, $\sin\theta = x$ and $\tan\theta = \frac{y}{x}$

B $\cos\theta = x$, $\sin\theta = y$ and $\tan\theta = \frac{x}{y}$

C $\cos\theta = x$, $\tan\theta = y$ and $\sin\theta = \frac{y}{x}$

D $\cos\theta = x$, $\sin\theta = y$ and $\tan\theta = \frac{y}{x}$

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36. Use technology to find the value of tan (–264°) to four decimal places.

A 9.5144 **B** –9.5144 **C** –0.1045 **D** 0.9945

37. Which of the following should be used to find the exact value of sin 45° without technology?

A Sketch, then estimate.

B Use a 1-1-$\sqrt{2}$ reference triangle.

C Use a 1-$\sqrt{2}$-3 reference triangle.

D Use a graph of $y = \sin x$.

38. The point A $\left(\frac{3}{5}, \frac{4}{5}\right)$ lies at the intersection of the unit circle and the terminal arm of an angle θ in standard position. Which of the trigonometric values below are true for θ?

A $\sin\theta = \frac{4}{5}$, $\cos\theta = \frac{3}{5}$, $\tan\theta = \frac{4}{3}$

B $\sin\theta = \frac{3}{5}$, $\cos\theta = \frac{4}{5}$, $\tan\theta = \frac{3}{4}$

C $\sin\theta = \frac{4}{5}$, $\cos\theta = \frac{3}{5}$, $\tan\theta = \frac{1}{5}$

D $\sin\theta = \frac{5}{4}$, $\cos\theta = 5/3$, $\tan\theta = \frac{3}{4}$

39. The point A (2, 1) lies on the terminal arm of an angle θ in standard position. Which of the following is the an approximate value of θ in degrees?

A $\frac{1}{2}°$ **B** 26.5° **C** 635.5° **D** 46°

40. If $\cos\theta = \frac{8}{17}$, which of the following are the remaining trigonometric ratios for θ?

A $\sin\theta = \frac{17}{8}$, $\tan\theta = \frac{8}{15}$, $\csc\theta = \frac{15}{17}$, $\sec\theta = \frac{8}{17}$, $\cot\theta = \frac{15}{8}$

B $\sin\theta = \frac{7}{18}$, $\tan\theta = \frac{8}{15}$, $\csc\theta = \frac{15}{17}$, $\sec\theta = \frac{8}{17}$, $\cot\theta = \frac{15}{8}$

C $\sin\theta = \frac{15}{17}$, $\tan\theta = \frac{15}{8}$, $\csc\theta = \frac{8}{17}$, $\sec\theta = \frac{8}{15}$, $\cot\theta = \frac{8}{15}$

D $\sin\theta = \frac{15}{17}$, $\tan\theta = \frac{15}{8}$, $\csc\theta = \frac{17}{15}$, $\sec\theta = \frac{17}{8}$, $\cot\theta = \frac{8}{15}$

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41. A wildlife biologist graphs the population of owls and the population of field mice in a certain area over a period of several years. Field mice are the main prey of these owls. The biologist discovers the population of owls is similar to the graph of $y = \sin x$ and the population of field mice is similar to $y = 3 \sin (x - \pi)$. Which of the following is correct for these two functions?

A The populations of the two species are in the same phase and their amplitude varies by π units.

B The phase shift is π units to the left and the population of field mice varies three times as much as the population of owls.

C The phase shift is π units to the right and the population of field mice varies three times as much as the population of owls.

D The phase shift is three and the amplitude of the owls population graph is $\frac{1}{\pi}$ that of the field mice.

42. Which of the following is the general form of the angles co-terminal with $\frac{\pi}{3}$?

A $\frac{\pi}{3} \pm 2\pi n$, where n is a natural number

B $\frac{\pi}{3} \pm \pi n$, where n is a natural number

C $\frac{2\pi}{3} \pm 2\pi n$, where n is a natural number

D $\frac{\pi}{3} \pm 2\pi$

43. There are 10 horses in a race. In how many ways can first, second, and third place be ordered?

A 5040 **B** 720 **C** 360 **D** 90

44. A coin is flipped, followed by the spinning of a four coloured spinner. What are the chances of correctly guessing the outcome of both?

A $\frac{1}{2}$ **B** $\frac{1}{5}$ **C** $\frac{1}{8}$ **D** $\frac{1}{16}$