

PreCalc 12 Chapter 6 Review 2017 v1 Answer Section

MULTIPLE CHOICE

1. ANS: B
Degree mode

PTS: 1 DIF: Easy
REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position
LOC: 12.T3 TOP: Trigonometry KEY: Procedural Knowledge
2. ANS: B
-.5 if missing units
Add/subtract multiples of 360° and see which one is NOT coterminal.

PTS: 1 DIF: Easy
REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position
LOC: 12.T1 TOP: Trigonometry
KEY: Conceptual Understanding | Procedural Knowledge
3. ANS: C
-.5 if missing units
-.5 if not exact
length must be positive, unit circle implies the radius is 1.

PTS: 1 DIF: Easy REF: 6.2 Angles in Standard Position and Arc Length
LOC: 12.T1 TOP: Trigonometry
KEY: Procedural Knowledge | Conceptual Understanding
4. ANS: C
-.5 if missing units
-.5 if not exact
length must be positive.

PTS: 1 DIF: Easy REF: 6.2 Angles in Standard Position and Arc Length
LOC: 12.T1 TOP: Trigonometry
KEY: Procedural Knowledge | Conceptual Understanding
5. ANS: C
-.5 if missing units
-.5 if not exact

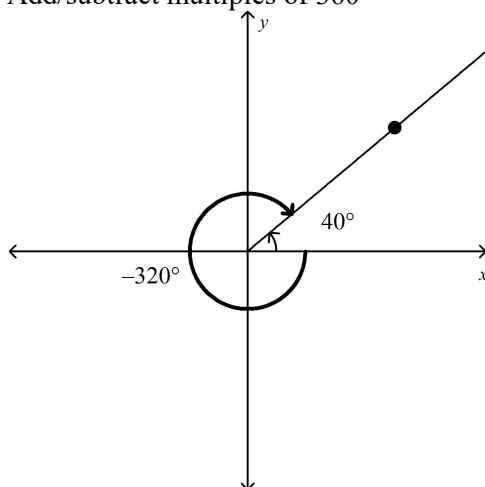
PTS: 1 DIF: Easy REF: 6.3 Radian Measure
LOC: 12.T1 TOP: Trigonometry KEY: Procedural Knowledge
6. ANS: A PTS: 1 DIF: Easy REF: 6.3 Radian Measure
LOC: 12.T3 TOP: Trigonometry KEY: Procedural Knowledge

7. ANS: D
-.5 if missing units
-.5 if missing set
- PTS: 1 DIF: Easy
REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position
LOC: 12.T1 TOP: Trigonometry KEY: Conceptual Understanding
8. ANS: B PTS: 1 DIF: Easy
REF: 6.4 Graphing Trigonometric Functions LOC: 12.T4
TOP: Trigonometry KEY: Conceptual Understanding
9. ANS: B
-.5 if not exact
- PTS: 1 DIF: Easy REF: 6.5 Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry KEY: Procedural Knowledge
10. ANS: C PTS: 1 DIF: Easy REF: 6.5 Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry KEY: Conceptual Understanding
11. ANS: D
-.5 if not exact
- PTS: 1 DIF: Easy REF: 6.5 Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry KEY: Procedural Knowledge
12. ANS: D PTS: 1 DIF: Easy REF: 6.5 Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry KEY: Conceptual Understanding
13. ANS: A PTS: 1 DIF: Easy
REF: 6.6 Combining Transformations of Sinusoidal Functions LOC: 12.T4
TOP: Trigonometry KEY: Procedural Knowledge
14. ANS: A PTS: 1 DIF: Easy
REF: 6.6 Combining Transformations of Sinusoidal Functions LOC: 12.T4
TOP: Trigonometry KEY: Procedural Knowledge
15. ANS: D PTS: 1 DIF: Easy
REF: 6.6 Combining Transformations of Sinusoidal Functions LOC: 12.T4
TOP: Trigonometry KEY: Procedural Knowledge
16. ANS: C
Determine general solution and look for non-matching denominator
- PTS: 1 DIF: Moderate REF: 6.4 Graphing Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry
KEY: Conceptual Understanding | Procedural Knowledge
17. ANS: D
Radian mode
- PTS: 1 DIF: Moderate REF: 6.5 Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry KEY: Conceptual Understanding

18. ANS: B
Radian mode
- PTS: 1 DIF: Moderate REF: 6.5 Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry
KEY: Conceptual Understanding | Procedural Knowledge
19. ANS: C
Radian mode
- PTS: 1 DIF: Moderate REF: 6.5 Trigonometric Functions
LOC: 12.T4 TOP: Trigonometry KEY: Conceptual Understanding
20. ANS: A PTS: 1 DIF: Moderate
REF: 6.6 Combining Transformations of Sinusoidal Functions LOC: 12.T4
TOP: Trigonometry KEY: Procedural Knowledge | Conceptual Understanding
21. ANS: D
-.5 if not equation
- PTS: 1 DIF: Moderate REF: 6.6 Combining Transformations of Sinusoidal Functions
LOC: 12.T4 TOP: Trigonometry
KEY: Procedural Knowledge | Conceptual Understanding
22. ANS: A
-.5 if not exact
- PTS: 1 DIF: Moderate REF: 6.7 Applications of Sinusoidal Functions
LOC: 12.T4 TOP: Trigonometry KEY: Procedural Knowledge
23. ANS: C
-.5 if missing units
- PTS: 1 DIF: Moderate REF: 6.7 Applications of Sinusoidal Functions
LOC: 12.T4 TOP: Trigonometry
KEY: Procedural Knowledge | Conceptual Understanding
24. ANS: B
-.5 if missing units
- PTS: 1 DIF: Moderate REF: 6.7 Applications of Sinusoidal Functions
LOC: 12.T4 TOP: Trigonometry
KEY: Procedural Knowledge | Conceptual Understanding
25. ANS: C
Radian mode
- PTS: 1 DIF: Moderate REF: 6.7 Applications of Sinusoidal Functions
LOC: 12.T4 TOP: Trigonometry
KEY: Procedural Knowledge | Conceptual Understanding

SHORT ANSWER

26. ANS:

Add/subtract multiples of 360° 

PTS: 1

DIF: Easy

REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position

LOC: 12.T1

TOP: Trigonometry

KEY: Procedural Knowledge | Conceptual Understanding | Communication

27. ANS:

-.5 if missing units

Add/subtract multiples of 360° -588° , -228° , and 132°

PTS: 1

DIF: Easy

REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position

LOC: 12.T1

TOP: Trigonometry

KEY: Conceptual Understanding | Procedural Knowledge

28. ANS:

Recall: The untransformed range is -1 to 1.

range: $-6 \leq y \leq 6$

PTS: 1

DIF: Easy

REF: 6.5 Trigonometric Functions

LOC: 12.T4

TOP: Trigonometry

KEY: Conceptual Understanding | Procedural Knowledge

29. ANS:

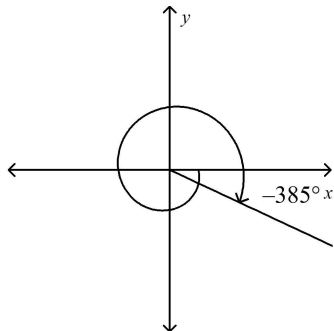
Put into principal angle first by adding/subtracting 360° or use MOD.

I: $\theta' = \theta$

II: $\theta' = 180^\circ - \theta$

III: $\theta' = 180^\circ + \theta$

IV: $\theta' = 360^\circ - \theta$

Reference angle: 25°

PTS: 1

DIF: Easy

REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position

LOC: 12.T1

TOP: Trigonometry

KEY: Procedural Knowledge | Conceptual Understanding | Communication

30. ANS:

-5 if not exact

- amplitude: 4
- period: 2π
- equation of the centre line: $y = -2$
- phase shift: $-\frac{\pi}{4}$

PTS: 1

DIF: Easy

REF: 6.6 Combining Transformations of Sinusoidal Functions

LOC: 12.T4

TOP: Trigonometry

KEY: Procedural Knowledge

31. ANS:

-1 if not exact

$$\cot\left(\frac{-\pi}{4}\right) = -1$$

PTS: 1

DIF: Moderate

REF: 6.3 Radian Measure

LOC: 12.T3

TOP: Trigonometry

KEY: Procedural Knowledge | Conceptual Understanding

32. ANS:
-.5 if not equation

$$y = 4 \sin 9 \left(x - \frac{3\pi}{4} \right) + 5$$

PTS: 1 DIF: Moderate REF: 6.6 Combining Transformations of Sinusoidal Functions
 LOC: 12.T4 TOP: Trigonometry
 KEY: Conceptual Understanding | Procedural Knowledge

33. ANS:
-.5 if not equation
Students' answers may vary. For example:

$$y = 6 \cos \frac{\pi}{9} (x - 4) + 10$$

PTS: 1 DIF: Moderate REF: 6.7 Applications of Sinusoidal Functions
 LOC: 12.T4 TOP: Trigonometry
 KEY: Conceptual Understanding | Procedural Knowledge

34. ANS:
-.5 if not equation
The minimum of a sinusoidal function is the centerline minus the amplitude.
15 cm

PTS: 1 DIF: Moderate REF: 6.7 Applications of Sinusoidal Functions
 LOC: 12.T4 TOP: Trigonometry
 KEY: Conceptual Understanding | Procedural Knowledge

35. ANS:
-.5 if not rounded correctly

$$r = \sqrt{\frac{2A}{\theta}}$$

Approximately 4.5 cm

PTS: 1 DIF: Difficult REF: 6.3 Radian Measure
 LOC: 12.T1 TOP: Trigonometry
 KEY: Procedural Knowledge | Conceptual Understanding

PROBLEM

36. ANS:

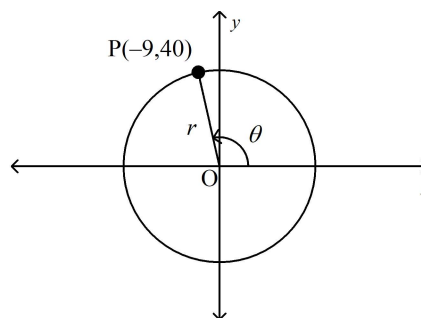
-1 if not exact

Sketch a diagram.

Let the length of OP be r .Use: $x^2 + y^2 = r^2$ Substitute $x = -9$ and $y = 40$.

$$(-9)^2 + (40)^2 = r^2$$

$$r = 41$$



$$\sin \theta = \frac{y}{r}$$

$$\csc \theta = \frac{r}{y}$$

$$\sin \theta = \frac{40}{41}$$

$$\csc \theta = \frac{41}{40}$$

$$\cos \theta = \frac{x}{r}$$

$$\sec \theta = \frac{r}{x}$$

$$\cos \theta = -\frac{9}{41}$$

$$\sec \theta = -\frac{41}{9}$$

$$\tan \theta = \frac{y}{x}$$

$$\cot \theta = \frac{x}{y}$$

$$\tan \theta = -\frac{40}{9}$$

$$\cot \theta = -\frac{9}{40}$$

PTS: 1

DIF: Moderate

REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position

LOC: 12.T3 TOP: Trigonometry

KEY: Procedural Knowledge | Conceptual Understanding

37. ANS:

$$\tan \theta = \frac{1}{3}$$

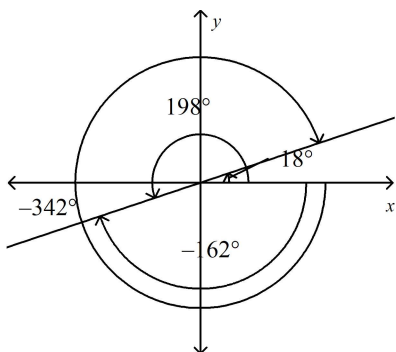
Since $\tan \theta$ is positive, the terminal arm of angle θ lies in Quadrant 1 or Quadrant 3.

The reference angle is: $\tan^{-1}\left(\frac{1}{3}\right) \doteq 18^\circ$

In Quadrant 1, $\theta \doteq 18^\circ$

In Quadrant 3, $\theta \doteq 180^\circ + 18^\circ$, or 198°

Sketch a diagram.



An angle that is coterminal with 18° in the domain $-360^\circ \leq \theta \leq 360^\circ$ is:
 $18^\circ - 360^\circ = -342^\circ$

An angle that is coterminal with 198° in the domain $-360^\circ \leq \theta \leq 360^\circ$ is:
 $198^\circ - 360^\circ = -162^\circ$

So, the possible measures of angle θ are approximately 18° , -342° , 198° , and -162° .

PTS: 1

DIF: Moderate

REF: 6.1 Trigonometric Ratios for Any Angle in Standard Position

LOC: 12.T3 TOP: Trigonometry

KEY: Procedural Knowledge | Conceptual Understanding

38. ANS:

-.5 if not exact

-.5 if missing units

The radius of the wheel, in inches, is: $\frac{36}{2} = 18$

The distance the wheel rolls, in inches, is: $\frac{30}{360} (2\pi)(18) = 3\pi$

The wheel rolls 3π inches backward.

PTS: 1

DIF: Moderate

REF: 6.2 Angles in Standard Position and Arc Length

LOC: 12.T1 TOP: Trigonometry

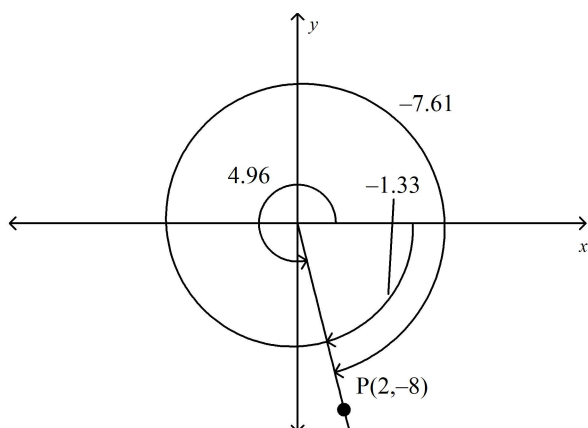
KEY: Conceptual Understanding | Procedural Knowledge | Problem-Solving Skills

39. ANS:

-.5 if not rounded correctly

The terminal arm of angle θ lies in Quadrant 4.The reference angle is: $\tan^{-1}\left(\frac{8}{2}\right) \doteq 1.3258$ In Quadrant 4, $\theta \doteq 2\pi - 1.3258$, or approximately 4.9574

Sketch a diagram.

The angles that are coterminal with 4.9574 in the domain $-3\pi \leq \theta \leq \pi$ are approximately:

$$4.9574 - 2\pi = -1.3258$$

$$-1.3258 - 2\pi = -7.6090$$

Possible values of θ are approximately: -7.6 and -1.3

PTS: 1 DIF: Moderate REF: 6.3 Radian Measure

LOC: 12.T3 TOP: Trigonometry

KEY: Conceptual Understanding | Procedural Knowledge

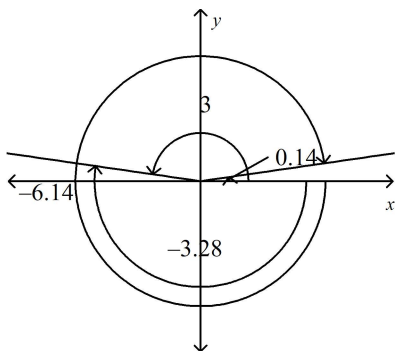
40. ANS:

-.5 if not rounded correctly

$$\sin \theta = \frac{1}{7}$$

Since $\sin \theta$ is positive, the terminal arm of angle θ lies in Quadrant 1 or Quadrant 2.The reference angle is: $\sin^{-1}\left(\frac{1}{7}\right) \doteq 0.1433$ In Quadrant 1, $\theta \doteq 0.1433$ In Quadrant 2, $\theta \doteq \pi - 0.1433$, or 2.9982

Sketch a diagram.

An angle that is coterminal with 0.1433 in the domain $-2\pi \leq \theta \leq 2\pi$ is:
 $0.1433 - 2\pi = -6.1398$ An angle that is coterminal with 2.9982 in the domain $-2\pi \leq \theta \leq 2\pi$ is:
 $2.9982 - 2\pi = -3.2849$ So, the possible measures of angle θ are approximately 0.1, -6.1, 3.0, and -3.3

PTS: 1 DIF: Moderate REF: 6.3 Radian Measure
 LOC: 12.T3 TOP: Trigonometry
 KEY: Procedural Knowledge | Conceptual Understanding

41. ANS:

The equation has the form $y = a \sin b(x - c) + d$.

The amplitude is 3, so $a = 3$.

The period is 4π , so $b = \frac{2\pi}{4\pi}$, or $\frac{1}{2}$.

The equation of the centre line is $y = -2$, so $d = -2$.

The phase shift is $\frac{\pi}{4}$, so $c = \frac{\pi}{4}$ and the sine function is increasing and crosses the centre line at $x = \frac{\pi}{4}$.

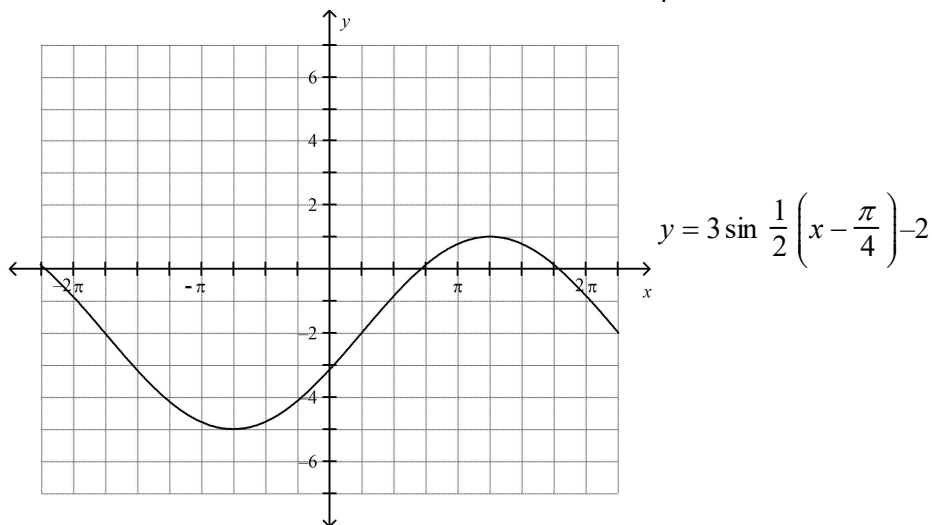
So, $a = 3$, $b = \frac{1}{2}$, $c = \frac{\pi}{4}$, and $d = -2$.

Substitute into $y = a \sin b(x - c) + d$

An equation is: $y = 3 \sin \frac{1}{2} \left(x - \frac{\pi}{4} \right) - 2$

The graph of $y = 3 \sin \frac{1}{2} \left(x - \frac{\pi}{4} \right) - 2$ is the graph of $y = \sin x$ after it is stretched vertically by a factor of 3,

stretched horizontally by a factor of 2, then translated $\frac{\pi}{4}$ units right and 2 units down.



PTS: 1

DIF: Moderate

REF: 6.6 Combining Transformations of Sinusoidal Functions

LOC: 12.T4

TOP: Trigonometry

KEY: Conceptual Understanding | Procedural Knowledge | Problem-Solving Skills | Communication

42. ANS:

-.5 if missing units

-.5 if not rounded correctly

The diameter of the tire is the maximum value of the function: 55 cm.

The circumference of the tire, in centimetres, is:

$$C = \pi d$$

$$= \pi(55)$$

$$= 55\pi$$

There are 10^5 cm in 1 km. So, the circumference of the tire, in kilometres, is: $\frac{55\pi}{10^5}$

The period of the function is 0.05 s, so the car travels forward a distance equivalent to one tire circumference, or $\frac{55\pi}{10^5}$ km, every 0.05 s.

So, in 1 s, it travels: $\frac{55\pi}{10^5 \times 0.05}$ km

And, in 1 h, it travels: $\frac{55\pi}{10^5 \times 0.05} \times 3600 \text{ km} \doteq 124$

The car's average speed is approximately 124 km/h.

PTS: 1 DIF: Difficult REF: 6.7 Applications of Sinusoidal Functions

LOC: 12.T4 TOP: Trigonometry

KEY: Conceptual Understanding | Procedural Knowledge | Problem-Solving Skills

43. ANS:

-1 if not exact (94.2478)

-.5 if missing units

shaded area = area of sector AOB – area of sector COD

The area, in square metres, of the larger circle is: $\pi(10)^2 = 100\pi$

The area, in square metres, of sector AOB is $\frac{4\pi}{2\pi}$ of the area of the larger circle.

$$\left(\frac{4\pi}{2\pi}\right)(100\pi) = 40\pi$$

The area, in square metres, of the smaller circle is: $\pi(5)^2 = 25\pi$

The area of sector COD is $\frac{4\pi}{2\pi}$ of the area of the smaller circle.

$$\left(\frac{4\pi}{2\pi}\right)(25\pi) = 10\pi$$

$$\begin{aligned} \text{shaded area} &= \text{area of sector AOB} - \text{area of sector COD} \\ &= 40\pi - 10\pi \\ &= 30\pi \end{aligned}$$

The area of the shaded region is 30π square metres.

PTS: 1

DIF: Difficult

REF: 6.3 Radian Measure

LOC: 12.T1

TOP: Trigonometry

KEY: Conceptual Understanding | Problem-Solving Skills | Procedural Knowledge