Chapters 4–6 Cumulative Review

Multiple Choice

1. Which of the following expressions has a value of -7?

a) $25^{\frac{1}{2}} + 16^{\frac{3}{4}}$

b) $8^{\frac{2}{3}} - 81^{\frac{3}{4}} + 4^2$

c) $8^{-\frac{3}{4}} - 81^{-\frac{3}{4}} + 8^{-3}$

d) $81^{-\frac{3}{4}} + 16^{-\frac{3}{4}} - 16^{-\frac{1}{2}}$

2. Identify the expressions that are true when $x = 2$.

a) $3^{2x-1} = 27$

b) $6^{2x-3} = \sqrt{6}$

c) $5^{3x+2} = \frac{1}{5}$

d) $(2^{2x})(2^{x-1}) = 32$

3. Identify the expression that simplifies to 1.

a) $(a^{10+2p})(a^{-p-8})$

b) $(2x^2)^{3-2m}\left(\frac{1}{x}\right)^{2m}$

c) $[(c)^{2n-3m}](c^3)^m \div (c^2)^n$

d) $\left[(x^{4n-m})\left(\frac{1}{x}\right)\right]^6$

4. The population of a town is growing at an average rate of 5% per year. In 2000, its population was 15 000. What is the best estimate of the population in 2020 if the town continues to grow at this rate?

a) 40 000 **c)** 35 000

b) 30 000 **d)** 45 000

5. Point $P(-7, 24)$ is on the terminal arm of an angle in standard position. What is the measure of the related acute angle and the principal angle to the nearest degree?

a) 74° and 106° **c)** 16° and 164°

b) 16° and 344° **d)** 74° and 286°

6. What is the exact value of csc 300°?

a) $\frac{\sqrt{3}}{2}$ **b)** $\frac{2}{\sqrt{3}}$ **c)** $-\frac{2\sqrt{3}}{3}$ **d)** $\frac{1}{2}$

7. Which equation is not an identity?

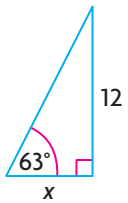
a) $(1 - \tan^2\theta)(1 - \cos^2\theta) = \frac{\sin^2\theta - 4\sin^4\theta}{1 - \sin^2\theta}$

b) $\frac{\tan x \sin x}{\tan x + \sin x} = \frac{\tan x \sin x}{\tan x \sin x}$

c) $\frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta + \sin\theta\cos\theta} = 1 - \tan\theta$

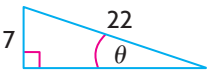
d) $\frac{\frac{1 - \cos x}{\cos x}}{\tan x} = \frac{1 - \cos x}{\sin x}$

8. What is the measure of x to the nearest unit?



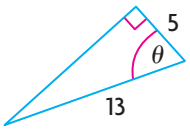
a) 4 **b)** 5 **c)** 6 **d)** 7

9. What is the measure of θ to the nearest degree?



a) 19° **b)** 22° **c)** 15° **d)** 27°

10. Which is the correct ratio for csc θ?

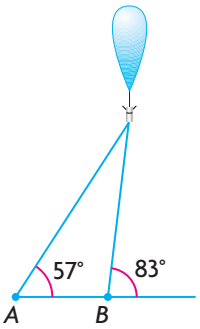


a) $\frac{5}{13}$ **b)** $\frac{13}{5}$ **c)** $\frac{13}{12}$ **d)** $\frac{12}{5}$

11. If $\tan\theta = \frac{4}{3}$ and θ lies in the third quadrant, which is the correct ratio for $\cos\theta$?

a) $\frac{4}{5}$ **b)** $-\frac{3}{5}$ **c)** $-\frac{4}{5}$ **d)** $\frac{3}{5}$

12. A weather balloon is spotted from two angles of elevation, 57° and 83°, from two different tracking stations. The tracking stations are 15 km apart. Determine the altitude of the balloon if the tracking stations and the point directly below the ballon lie along the same straight line.



a) 28.5 km
b) 32 km
c) 984 km
d) 23.7 km

13. At a concert, a spotlight is placed at a height of 12.0 m. The spotlight beam shines down at an angle of depression of 35°. How far is the spotlight from the stage?

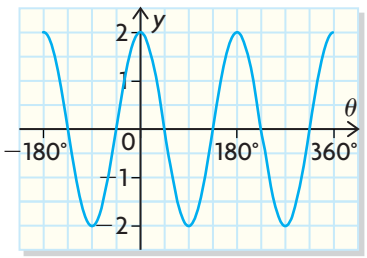
a) 20.9 m
b) 12.1 m
c) 25 m
d) 9.6 m

14. In $\triangle ABC$, $\angle A = 32°$, $\angle C = 81°$, and $a = 24.1$. Solve the triangle, and identify the correct solution.

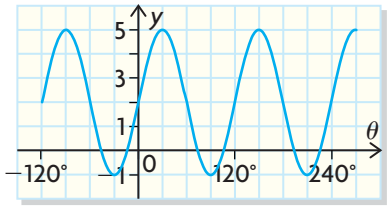
a) $\angle B = 125°$, $AC = 14.2$, $AB = 44.9$
b) $\angle B = 52°$, $AC = 41.9$, $AB = 44.9$
c) $\angle B = 107°$, $AC = 29.4$, $AB = 44.9$
d) $\angle B = 67°$, $AC = 41.9$, $AB = 44.9$

15. Which is the graph of $y = 2\cos 2(\theta + 45°) + 4$?

a)



b)



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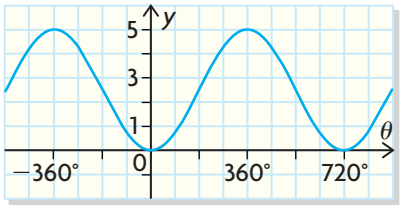
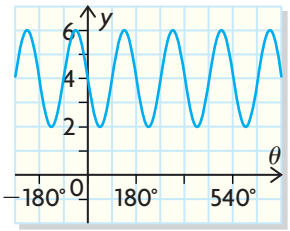


d)



16. Refer to the graphs in question 15. Which is the graph of $y = 2\cos 2\theta$?

a) graph a)
b) graph b)
c) graph c)
d) graph d)

17. A sine function has an amplitude of 5, a period of 720°, and range $\{y \in \mathbf{R} \mid 2 \leq y \leq 12\}$. Identify the correct equation of this function.

a) $y = 5\sin 2\theta + 7$
b) $y = 5\sin 2\theta - 7$
c) $y = 5\sin 0.5\theta + 7$
d) $y = 5\sin 0.5\theta - 7$

18. Identify which of the following statements is true regarding sinusoidal functions of the form $y = a\sin(k(x - d)) + c$.

a) Changing the value of a affects the maximum and minimum values, the amplitude, and the range.

b) Changing the value of k affects the amplitude, the equation of the axis, and the domain and range.

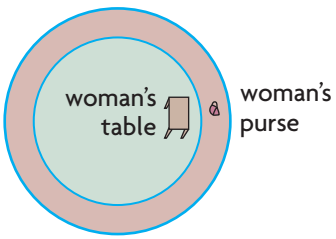
c) Changing the value of c affects the period, the amplitude, or the domain.

d) Changing the value of d affects the period, the amplitude, and the equation of the axis.

19. A circular dining room at the top of a skyscraper rotates in a counterclockwise direction so that diners can see the entire city. A woman sits next to the window ledge and places her purse on the ledge as shown. Eighteen minutes later she realizes that her table has moved, but her purse is on the ledge where she left it. The coordinates of her position are $(x, y) = (20\cos(7.5t)°, 20\sin(7.5t)°)$, where t is the time in minutes and x and y are in metres. What is the shortest distance she has to walk to retrieve her purse?

a) 54.1 m **c)** 114.0 m

b) 37.0 m **d)** 62.9 m



20. Which of the following statements is not true about the graph of $y = \sin x$?

a) The period is 360°.

b) The amplitude is 1.

c) The equation of the axis is $y = 0$.

d) The range is $\{y \in \mathbf{R} \mid 0 < y < 1\}$.

21. A regular octagon is inscribed inside a circle with a radius of 14 cm. The perimeter is

a) 32.9 cm **c)** 85.7 cm

b) 56.0 cm **d)** 42.9 cm

22. In $\triangle ABC$, $\angle A = 85°$, $c = 10$ cm, and $b = 15$ cm. A possible height of $\triangle ABC$ is

a) 10.0 cm **c)** 13.8 cm

b) 8.6 cm **d)** 12.5 cm

23. The exact value of $\cos(-420°)$ is

a) $\frac{1}{2}$ **c)** $\frac{\sqrt{3}}{2}$

b) $-\frac{\sqrt{3}}{2}$ **d)** 1

24. Using the definitions $\sin\theta = \frac{y}{r}$, $\cos\theta = \frac{x}{r}$, and $\tan\theta = \frac{y}{x}$, the simplified form of the expression $\frac{\sin^2\theta + \cos^2\theta}{\frac{\cos\theta}{\sin\theta}}$ is

a) $\frac{x}{y}$ **b)** $\frac{y}{x}$ **c)** $\frac{x}{r}$ **d)** $\frac{y}{r}$

25. The simplified form of the expression $\frac{\sin x \sin x}{(1 - \sin x)(1 + \sin x)}$ is

a) $\frac{\sin^2 x}{\cos x}$ **c)** $\tan^2 x$

b) $\frac{\sin^2 x}{\sin x}$ **d)** $\frac{\sin^2 x}{1 + \sin^2 x}$

26. The period of the function $y = \sin 4\theta$ in degrees is

a) 360° **b)** 180° **c)** 90° **d)** 1440°

27. $\left(\left(\frac{1}{a}\right)\left(\frac{1}{b^{-1}}\right)\right)^{-1}$ is equivalent to

a) $\frac{a}{b}$ **b)** $\frac{b}{a}$ **c)** $\frac{-a}{b}$ **d)** $\frac{-b}{a}$

28. If $3x^{\frac{1}{2}} = 12$, then x is equal to

a) 576 **b)** 64 **c)** 16 **d)** $\frac{1}{64}$