

Cumulative Review Test 3

Trigonometric Functions

- Draw each angle. Indicate the principal angle and its measure, plus the measure of the related acute angle.
 - -100°
 - 845°
 - $\frac{-7\pi}{8}$
 - $\frac{17\pi}{6}$
- Point $P(-3, 8)$ lies on the terminal arm of θ , an angle in standard position.
 - Draw a diagram of θ .
 - Determine the primary trigonometric ratios of θ .
 - Determine the measure of θ to the nearest degree.
- Express each angle in radians.
 - 15°
 - 120°
 - -270°
 - 216°
- Express each angle in degrees.
 - $\frac{13\pi}{6}$
 - $\frac{8\pi}{9}$
 - $\frac{-5\pi}{4}$
 - $\frac{13\pi}{16}$
- For each function
 - state the amplitude, period, phase shift, and vertical shift
 - sketch the graph
 - $y = 3 \sin \theta - 1$
 - $y = \tan \theta$
 - $y = -2 \cos(\theta - 30^\circ) + 2$
 - $y = 3 \sin 2(\theta + 45^\circ) - 1$
 - $y = 0.5 \cos 3\left(\theta - \frac{\pi}{6}\right) + 4$
 - $y = -5 \sin\left(\frac{\theta}{2} - \frac{2\pi}{3}\right) + 1$
- A Ferris wheel has a radius of 10 m and completes one full revolution in 36 s. The riders board the ride from a platform 1 m above the ground at the bottom of the wheel.
 - Determine an equation that models the position of a rider above the ground, at time, t , in seconds.
 - Determine a rider's height above the ground 10 s after the ride starts.
 - When will the rider be at the maximum height? What is this height?
- Solve. Round answers to two decimal places.
 - $0.5 = \sin \theta, 0 \leq \theta \leq 2\pi$
 - $3 = 4 \sin x - 2, 0^\circ \leq x \leq 360^\circ$
 - $6 = 4 - 5 \cos 3\theta, 0 \leq \theta \leq 2\pi$
 - $9 = 4 \tan 2x, 0^\circ \leq x \leq 360^\circ$
- The Lazars recently bought a cottage on a small sheltered inlet on Prince Edward Island. They wish to build a dock on an outcropping of level rocks. To determine the tide's effect at this position, they measured the depth of the water every hour over a 24-h period.

Time	1:00	2:00	3:00	4:00	5:00	6:00
Depth (m)	3.81	5.05	5.94	6.25	5.89	4.95

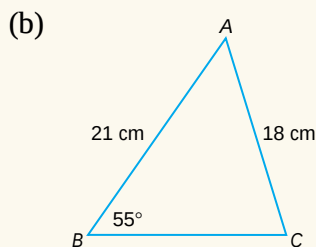
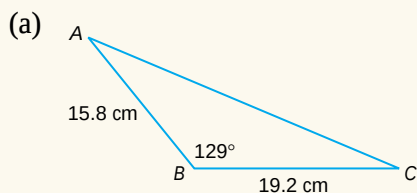
Time	7:00	8:00	9:00	10:00	11:00	12:00
Depth (m)	3.69	2.45	1.56	1.25	1.62	2.55

Time	13:00	14:00	15:00	16:00	17:00	18:00
Depth (m)	3.81	5.05	5.94	6.25	5.89	4.95

Time	19:00	20:00	21:00	22:00	23:00	24:00
Depth (m)	3.69	2.45	1.56	1.25	1.62	2.55

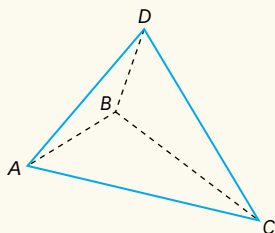
- (a) Graph the data and determine an equation that models this situation over a 24-h period.
- (b) What is the maximum depth of the water at this location?
- (c) The hull of their boat must have a clearance of at least 1 m at all times. Is this location suitable for their dock? Explain.

9. Solve each triangle.



- (c) $\triangle DEF$: $d = 15$ m, $e = 18$ m, and $f = 20$ m
- (d) $\triangle QRS$: $\angle Q = 36^\circ$, $\angle R = 27^\circ$, and $s = 55.4$ cm

10.



Determine the surface area to two decimal places, where:
 $AB = BD = 12$ cm, $AD = 16$ cm, and
 $AC = BC = DC = 20$ cm.

11. Two airplanes leave the same airport in opposite directions. At 2:00 P.M., the angle of elevation from the airport to the first plane is 28° and to the second plane is 19° . The elevation of the first plane is 9 km. The elevation of the second plane is 7.2 km. Find the air distance between the two airplanes.

12. Determine the exact value.

- (a) $\sin \pi$ (b) $\cos \frac{7\pi}{6}$
- (c) $\tan(-225^\circ)$ (d) $\sin 300^\circ$
- (e) $\sin 45^\circ \cos 135^\circ + \tan 30^\circ \tan 210^\circ$
- (f) $\cos \frac{5\pi}{3} \cos \frac{3\pi}{2} - \sin \frac{5\pi}{3} \sin \frac{3\pi}{2}$

13. Prove each identity.

- (a) $\sin x + \tan x + \cos x \tan x = \tan x (2 \cos x + 1)$
- (b) $\sin^2 \theta - \sin^4 \theta = \cos^2 \theta - \cos^4 \theta$
- (c) $\frac{1 + \sin x}{\cos x} + \frac{\cos x}{1 + \sin x} = \frac{2}{\cos x}$
- (d) $\frac{\tan^2 \alpha}{\tan^2 \alpha + 1} = \sin^2 \alpha$

14. Solve. Where necessary, round to one decimal place.

- (a) $2 \sin^2 x \tan x - \tan x = 0$,
 $0 \leq x \leq 2\pi$
- (b) $15 \sin^2 x - 7 \sin x = 2$,
 $0^\circ \leq x \leq 360^\circ$
- (c) $\tan^2 x - 2 \tan x + 1 = 0$,
 $0 \leq x \leq 2\pi$
- (d) $4 \cos^2 x - 3 = 0$, $0^\circ \leq x \leq 360^\circ$

15. The depth of the ocean at a swim buoy can be modelled by $y = 5 + 3 \sin \frac{\pi}{6}t$, where y is the water depth in metres and t is the time in hours. Consider a day for which $t = 0$ represents 12:00 midnight. For that day, when do high and low tides occur?