

Trigonometric Functions and the Unit Circle: math test, Grade 11 – download the PDF

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Radians and degrees

/ 3 pts

Convert, giving exact answers.

- a. 72° to radians.
- b. $\frac{5\pi}{12}$ radians to degrees.
- c. $\frac{7\pi}{9}$ radians to degrees.

2 Exact values

/ 4 pts

Give the exact value, without a calculator.

- a. $\sin \frac{2\pi}{3}$
- b. $\cos \frac{7\pi}{6}$
- c. $\tan \frac{5\pi}{4}$
- d. $\sin \left(-\frac{\pi}{6}\right)$

3 Using the identity

/ 3 pts

The angle θ lies in quadrant III and $\sin \theta = -\frac{8}{17}$.

- Find $\cos \theta$, and justify its sign.
- Find $\tan \theta$.

4 Reading a sinusoid

/ 3 pts

Consider $y = 2 \sin(4x - \pi) + 3$.

- Rewrite it as $y = A \sin(B(x - C)) + D$.
- Give the amplitude, the period, the phase shift and the midline.
- Give the maximum and minimum values.

5 Equations

/ 3 pts

Solve on $[0, 2\pi)$.

- $2 \sin x = \sqrt{3}$
- $2 \cos^2 x + \cos x - 1 = 0$

6 A floating buoy

/ 4 pts

The height in meters of a buoy above the sea floor is $h(t) = 2 + 1.5 \sin \frac{\pi t}{5}$, where t is in seconds. A calculator is allowed for part (d).

- Find the period, the maximum height and the minimum height.
- Find $h(2.5)$.
- Solve $h(t) = 2$ for $0 \leq t \leq 10$.
- Convert the maximum height to feet to the nearest hundredth (1 ft = 0.3048 m).



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