

Unit 5 Review

Periodic Functions

Topics:

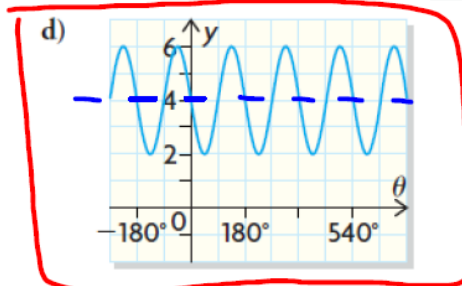
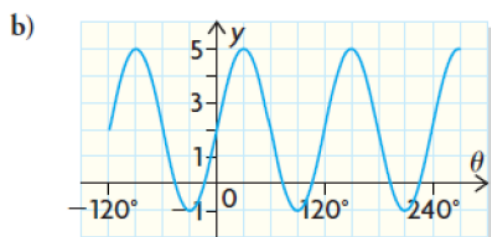
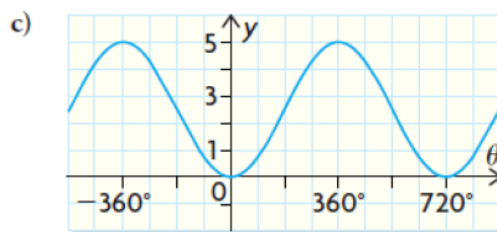
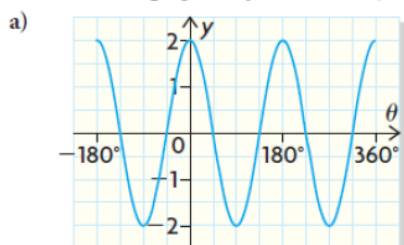
- Periodic Functions
- Sine and Cosine Curves
- Trigonometric Transformations
- Modelling with Trig Equations
- Solving Trig Equations

Nelson Page 409 #s 15 - 20 & 26



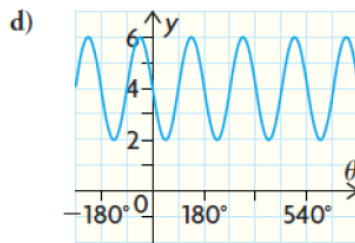
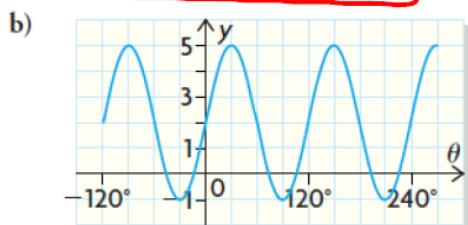
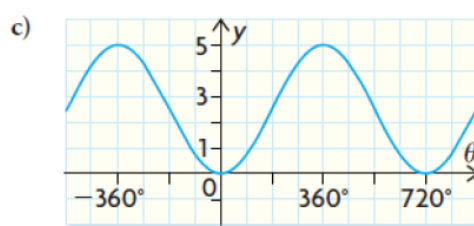
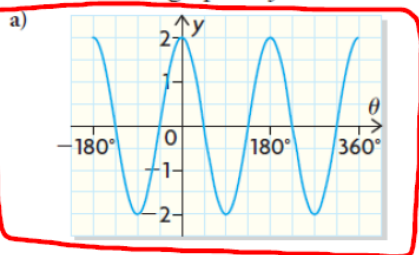
Solutions

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



Equation of axis is $y = 4 \Rightarrow (d)$

16. Which is the graph of $y = 2 \cos 2\theta$?



cosine starts at a maximum
amplitude of 2
period = $\frac{360}{2} = 180^\circ$

17. A sine function has an amplitude of 5, a period of 720° , and range $\{y \in \mathbb{R} \mid 2 \leq y \leq 12\}$. 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) $y = 5 \sin 0.5\theta - 7$

$$k = \frac{360}{\text{period}} = \frac{360}{720} = 0.5$$

$$\text{max} = 12 \quad c = \frac{\text{max} + \text{min}}{2}$$

$$\text{min} = 2$$

$$\Rightarrow c = \frac{12 + 2}{2} = \frac{14}{2} = 7$$

18. Identify which of the following statements is true regarding sinusoidal functions of the form

$$y = a \sin(k(x - d)) + c$$

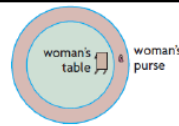
- a) Changing the value of a affects the maximum and minimum values, the amplitude, and the range.
- b) Changing the value of k affects the amplitude, the equation of the axis, and the domain and range.
- c) Changing the value of c affects the period, the amplitude, or the domain.
- d) Changing the value of d affects the period, the amplitude, and the equation of the axis.

k affects none of these

c affects none of these

d affects none of these

9. 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?



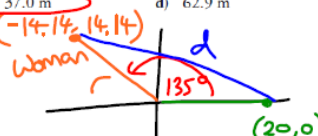
- a) 54.1 m
- b) 37.0 m
- c) 114.0 m
- d) 62.9 m

$$x_w = 20 \cos(7.5(18)) = -14.14$$

$$y_w = 20 \sin(7.5(18)) = 14.14$$

$$x_p = 20 \cos(7.5(0)) = 20$$

$$y_p = 20 \sin(7.5(0)) = 0$$



After 18 mins, turned through $(7.5)(18) = 135^\circ$.

$$r^2 = x_w^2 + y_w^2 = (-14.14)^2 + (14.14)^2 = 400$$

$$r = \sqrt{400} = 20$$

using the cosine law

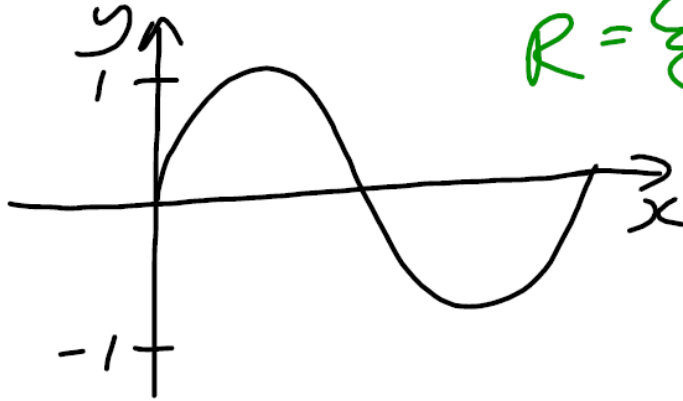
$$d^2 = 20^2 + 20^2 - 2(20)(20) \cos 135$$

$$d^2 = 1365.685425$$

$$d = \sqrt{1365.685425} = 36.955$$

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 $\{y \in \mathbb{R} \mid 0 < y < 1\}$.



$$R = \{y \in \mathbb{R} \mid -1 \leq y \leq 1\}$$

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

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

$$\begin{aligned} \text{Period} &= \frac{360}{k} \\ &= \frac{360}{4} \\ &= 90^\circ \end{aligned}$$