

Name: _____

MHF4U – Diagnostic Assessment

Use scrap paper to solve each question then place final answers in the spaces provided.

1. Given the function $f(x) = x^2 - 3x + 5$, expand and simplify the following:

a) $f(-3) - f(2)$ _____

b) $f(x - 1)$ _____

c) $\frac{f(x+h)-f(x)}{h}$ _____

d) $3f(x - 1) + 5$ _____

2. If $f(x) = 2x + 1$ and $g(x) = 3x^2 - 6$, expand and simplify $f(g(x))$ _____

3. Fully factor $6x^2 + 11x - 10$ _____

4. Fully factor $-2x^2 + 10x + 12$ _____

5. For each rational function below, state the implicit restrictions; do not simplify:

a) $\frac{x}{3} + \frac{y}{2x-3}$ _____

b) $\frac{x+2}{4} \times \frac{3}{x-y}$ _____

c) $\frac{y}{5} \div \frac{x+2}{3}$ _____

6. Simplify each rational expression; do not state the restrictions:

a) $\frac{2}{x+3} - \frac{5}{x^2+2x-3}$ _____

b) $\frac{2x+10}{x-3} \times \frac{x+1}{x^2+6x+5}$ _____

c) $\frac{2}{x-1} + \frac{3}{x}$ _____

7. How many real solutions does the equation $x^2 = 5x - 7$ have? _____

8. Determine the equation of a quadratic function that has x-intercepts of 3 and 7 and goes through the point (8, -10) _____

9. Determine the coordinates of the vertex for the quadratic function $y = 2x^2 + 4x - 6$ _____

10. Solve the following exponential equations:

a) $3^x = 30$ _____

b) $4^{3x+1} = 32^{x+1}$ _____

c) $2^{x+3} = -16$ _____

11. Evaluate the following using exact values:

a) $\sin(60^\circ)$ _____

b) $\cos(135^\circ)$ _____

c) $\tan(-150^\circ)$ _____

12. If the coordinates of a point on the end of a terminal arm is (12, -5), what is the angle in standard position? _____

13. Solve the following trigonometric equations given $0^\circ \leq \theta \leq 360^\circ$.

Note: Some of these may have more than one answer; in those cases provide both.

a) $\cos\theta = -0.5$ _____

b) $\sin\theta = 1$ _____

c) $\cot\theta = \frac{1}{\sqrt{3}}$ _____

14. List features for the sinusoidal function $y = -3\cos(4\theta - 120^\circ) + 4$

a) Amplitude _____

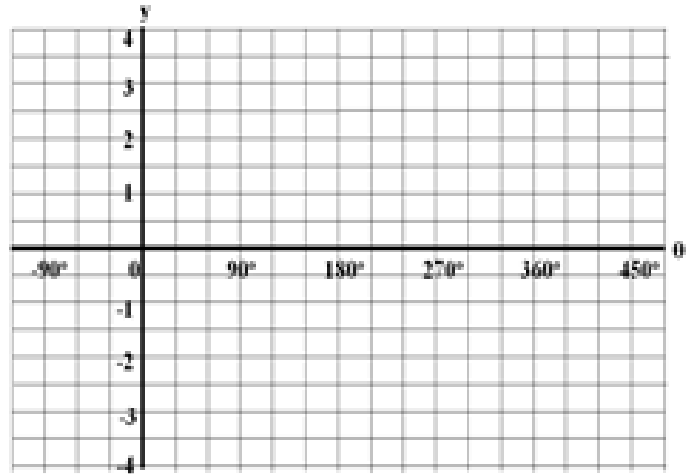
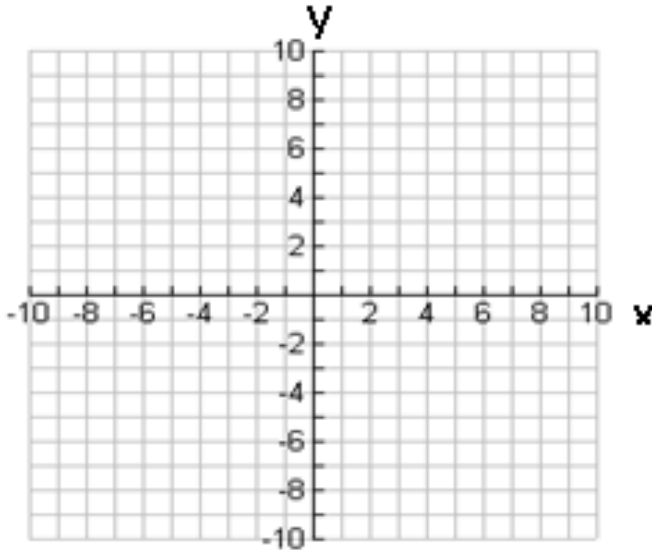
b) Period _____

c) Range _____

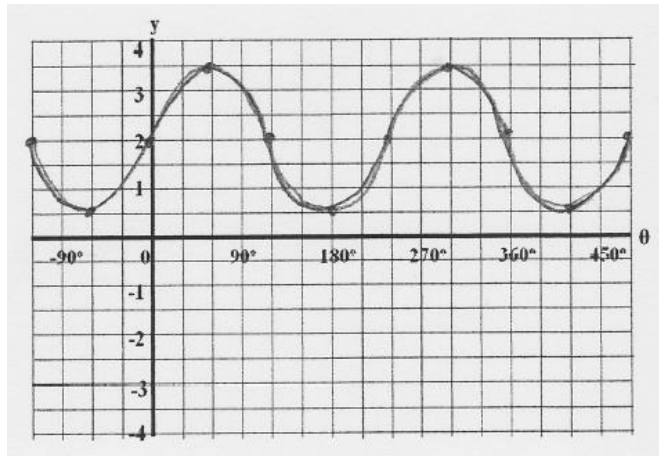
15. Graph the following

a) $y = 2\sqrt{-x+1} - 4$

b) $y = 3\cos(2\theta + 60^\circ) - 1$



16. Consider the graph for the sinusoidal function $y = 1.5\cos[k(\theta - d)] + 2$ below



What is the value of k ?

What is the smallest positive value of d ?

17. Determine the inverse of the function $y = -\sqrt{x - 2}$

18. Is the inverse of $y = 4x^2 - 18$ a function?
