

Show all your details work on separate sheet(s)

1. Simplify Completely. Be sure to state restrictions on the variable.

$$\frac{x^2 - 9}{4x + 12} + \frac{8x^2 + 16x}{x^2 - x - 6} \div \frac{2x}{x - 3}$$

2. Determine the production level required for maximum profit. What is the maximum profit?
Given: $P(x) = -3x(x-50)+1000$, where x is the number of items produced and $P(x)$ is the profit in dollars.

3. Given the parent function, $f(x) = \frac{1}{x}$ and the transformation described as $y = -2f(x + 4) - 5$
Write the image equation and state the domain and range of both the parent function and the image equation.

4. Simplify, leave no negative exponents.

$$\left(\sqrt[5]{\frac{-32x^{-4}}{x^{21}}} \right)^3$$

5. Find all values of A , given
 $-180^\circ \leq A \leq 720^\circ$

$$\csc A = -\sqrt{2}$$

6. High tide is at 4 a.m. when the water is 6 m deep. Low tide is at 8 a.m. when the water is 1 m deep.
- a) Determine the following:
- | | | |
|----------|------------------------------|--------------|
| Maximum: | Minimum: | Amplitude: |
| Period: | Equation of Sinusoidal Axis: | Phase Shift: |
- b) Construct a model for the height of the function over time using a cosine function, where t is the time in hours since 4 a.m. and $H(t)$ is the height of the water, in metres.
- c) Construct a model for the height of the function over time using a sine function, where t is the time in hours since 12 a.m. and $H(t)$ is the height of the water, in metres.
7. In a geometric sequence, $t_5 = 162$ and $t_{10} = 39366$. Find an expression for the n th term.
8. \$440 grew to \$505.45 at 3.5%/a simple interest. For how long was the money invested?
9. \$5000 is invested at 4.3%/a compounded weekly for 18 months. How much interest is earned on the investment?