

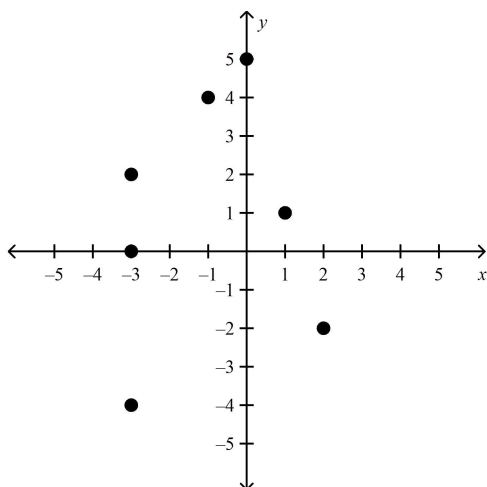
## Exam Review (more problems)

Here are a few more review problems. Solutions to be posted Saturday. Note that you may have seen some of these problems on previous review or previous tests (there are only so many problems to go around...)

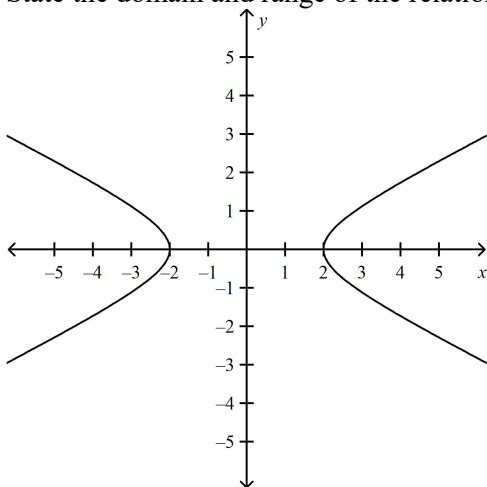
### Full Solution

Write clear and well written solutions using the following problems.

1. What are the domain and range of the graph? Is the graph a function?



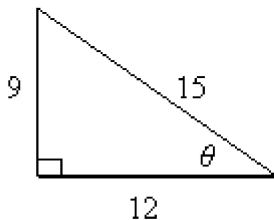
2. State the domain and range of the relation shown. Is the relation a function?



3. A rectangular aquarium has length  $(x + 10)$ , width  $(x + 4)$ , and height  $(x + 6)$ . Determine a simplified function that represents the volume of the aquarium.

4. Simplify  $\frac{4c + 16}{5c} \div \frac{c + 4}{15c^3}$  and state any restrictions on the variables.
5. Simplify  $\frac{4 - x}{3x^2 - 4x - 4} \div \frac{5x - 20}{6x^2 - 17x + 10}$  and state any restrictions on the variables.
6. A quadratic function has these characteristics:  
 $x = 1$  is the equation for the axis of symmetry.  
 $x = 2$  is an  $x$ -intercept.  
 $y = 2$  is the maximum value.  
 Determine the  $y$ -intercept of this parabola.
7. Does the parabola for the function  $f(x) = -(x - 7)^2 + 10$  open up or down? What is the range? Explain your answer.
8. The cost function for a container company is  $C(x) = 10x + 30$  and the revenue function is  $R(x) = -x^2 + 24x$ , where  $x$  is the number of containers sold, in thousands. Determine the profit function for the number of containers sold. Then determine the number of containers sold that maximizes profit.
9. Travis and Laura are rock climbing. Travis throws a spike to Laura. The function  $h(t) = -5t^2 + 20t + 110$  models the height of the spike in metres above the ground at time  $t$ . Laura is 135 m above the ground. Did Travis' throw reach Laura? Explain your answer.
10. Simplify.  
 $3\sqrt{12} + \sqrt{24} - 2\sqrt{36}$
11. Simplify  $(7 + \sqrt{50})(-9 - \sqrt{32})$ .
12. Simplify the expression. Express your answer with positive exponents. Explain each of your steps.  

$$\left( \frac{(4x^6)^3 (4y^{-8})}{(2x)^4 (12y^3)^2} \right)^{\frac{1}{2}}$$
13. Given the following triangle, state the six trigonometric ratios for  $\angle \theta$ .



14. The base of a 7 m log rests against the ground. It ramps up to a branch in a tree at an angle of elevation of  $60.1^\circ$ .
- Calculate the height of the branch to the nearest tenth of a metre.
  - What is the distance from the base of the tree to the base of the log?

15. Determine the exact value of  $\frac{\cos^2 45^\circ}{\sin 30^\circ} \times \tan 60^\circ$ .

16. Determine:
- the trig ratios **exactly** for the following: i)  $\sin(225)$     ii)  $\cos(120)$
  - the angles (exactly for i) rounded to one decimal place for ii)

i)  $\cos(\theta) = -\frac{\sqrt{3}}{2}$                       ii)  $\sin(\theta) = -0.2345$

17. Finish the proof of the following identity. (note - on the exam you will have one identity to fully prove)

$$1 = \frac{(\sin^4 x - \cos^4 x)}{\tan x \sin x \cos x - \cos^2 x}$$

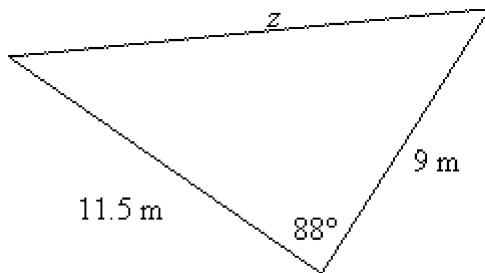
R.S.:  $\frac{(\sin^4 x - \cos^4 x)}{\tan x \sin x \cos x - \cos^2 x}$

$$= \frac{(\sin^2 x - \cos^2 x)(\sin^2 x + \cos^2 x)}{\frac{\sin x}{\cos x} \sin x \cos x - \cos^2 x}$$

...  
...

18. A triangular plot of land is enclosed by a fence. One side of the fence is 8.1 m long with an opposite angle of  $75^\circ$ . An adjacent side of the fence is 5.7 m long with an opposite angle of  $\theta$ .
- Make a sketch of the situation.
  - Determine  $\theta$  to the nearest degree.

19. Determine  $z$  to the nearest tenth of a metre.



20. Jake wants to know the height of a sign across a road. He stands directly across from the sign and notices the angle of elevation to the top of the sign is  $18^\circ$ . Jake then walks 40 m parallel to the road and observes the angle between the base of the sign and Jake's previous spot is  $54^\circ$ . What is the height,  $h$ , of the sign to the nearest tenth of a metre?
21. For the following table of data, determine an equation of a sine function that satisfies the given data. (note - be sure you know all of the transformations of sinusoidal functions. You might have to sketch one)

$x$	$-120^\circ$	$-60^\circ$	$0^\circ$	$60^\circ$	$120^\circ$	$180^\circ$	$240^\circ$
$y$	1.5	3	1.5	0	1.5	3	1.5

22. The 8th term of an arithmetic sequence is 3 and the 100th term is 49. What is the recursive formula for the sequence?
23. Determine the number of terms in the sequence:  $-45, -32, -19, -6, \dots, 124$ .
24. The 3rd term of a geometric sequence is 36, and the 6th term is  $\frac{9}{2}$ . What is the recursive formula for the sequence?
25. Calculate the sum of the series:  $-396 - 308 - 220 - 132 - \dots + 836$ .
26. A farmer has to plant seeds in a triangular field. He knows that the middle row, row 26, needs 4025 seeds, and that the last row needs 7525 seeds. If the number of seeds planted in each row follows an arithmetic series, how many total seeds does he need?
27. Calculate the sum of the Geometric series  $8 - 4 + 2 - 1 + \dots + \frac{1}{8}$ .
28. The sum of a geometric sequence  $2 - 6 + 18 - 54 + \dots - t_n = -29\,524$ . Find the number of terms.
29. What is the total amount owed after 1, 2, and 3 years on a loan of \$3500 at 6.8%/a simple interest?
30. Renata invests \$10 000 in an account that earns 4.5%/a compounded quarterly for 25 years. What will be the value of her investment after 25 years?
31. Enzo buys a new car and at an interest rate of 7.8% compounded monthly. Five years later, he paid a total of \$28 469.78 for the principal and interest. How much did the car originally cost?
32. Bruce decides to save \$1200 every month at 2.4%/a compounded monthly for 40 years. What is the value of Bruce's savings account at the end of 40 years?
33. How much do you need to invest in an account today so that you can be *regularly* paid \$2000 per month for 25 years if the account pays 3%/a? How much interest do you earn over the 25 years?