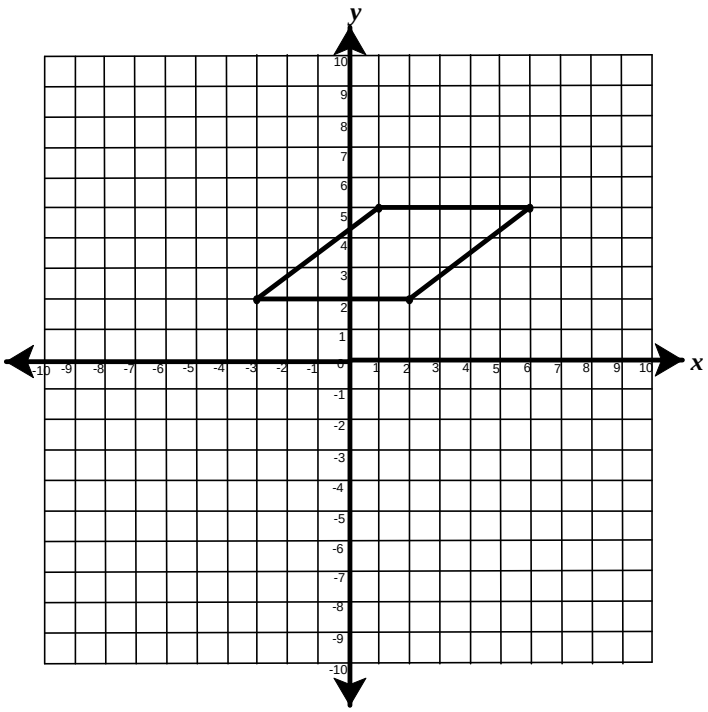
A quadrilateral is graphed on the coordinate grid below.



1. Reflect and label the given quadrilateral *ABCD* across the *x*-axis to generate a new quadrilateral.

2. List the coordinates of the new quadrilateral.

3. Shift the new quadrilateral 4 units left and 2 units down. Label the coordinates of the new vertices.

4. Dilate the shifted quadrilateral using a scale factor of 2. Sketch and label the coordinates of the vertices.

5. Translate and label the given quadrilateral ABCD using the rule $(x, y) \rightarrow (x - 3, y + 2)$.

6. Dilate the given quadrilateral *ABCD* such that (1, 5) becomes (2, 10). List the other coordinates of the new vertices.

7. Draw the diagonals of the given quadrilateral *ABCD*. What is the y-intercept of the diagonal which has a positive slope?

8. What is the area of the quadrilateral?

9. Reflect the quadrilateral *ABCD* across the *y*-axis and then translate this image 4 units up. What are the new coordinates?

10. Write the equation of the diagonal of *ABCD* which has a negative slope, in point-slope form.

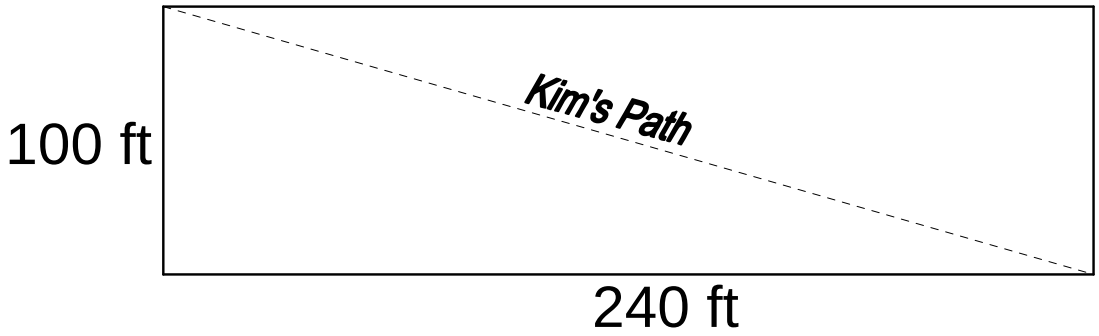
11. What is the perimeter of the quadrilateral *ABCD*?

12. Rotate and sketch the quadrilateral *ABCD* 90 degrees counter-clockwise. Label the coordinates of the new quadrilateral.

13. Rotate the quadrilateral *ABCD* ***about*** the *x*-axis to generate a solid. Sketch the solid.
    a) In your own words, describe the solid.
    b) What is the surface area of the solid you generated?
    c) What is the volume of the solid you generated?

14. Modify the angles of the original parallelogram to generate a rectangle.
    a) What are the measures of the angles?
    b) If you generate a *new* solid from the rectangle would the surface area change? Why?
    c) Would the volume change? Why?

Kim walked diagonally across a rectangular field that measured 100 feet by 240 feet.



1. Express the length of Kim's path to the nearest foot.

2. Kim has decided to enclose the field.
    a. How much fencing should she order?
    b. Describe what factors Kim should know before she orders fencing materials.
    c. If the fencing is sold in 5 foot lengths only,
        1) how many lengths will she need to order?
        2) The Fence Company delivers 140 sections of fencing. How could Kim enclose the field to have a maximum amount of usage and use all the sections? Should she discard any sections of the fencing? If so, how many sections?
    d. Kim has only has the area shown in the diagram. She wants to maintain a path 3 ft wide outside of the fenced area and surrounding the fenced area.
    e. What dimensions of a fenced area would give her the maximum area for a fenced field?

3. Determine the perimeter of the field.

4. Determine the area of the field to the nearest foot.

5. a. By walking the path shown in the diagram rather than walking the length and the width, does Kim save on the number of feet walked? If so, how many feet?

b. If Kim would modify her path by the following description, would she save on the number of feet walked as stated in the two paths described in part a. If so, by how much?

"Kim begins at the corner as shown, but walks to the midpoint of the opposite side. Then she continues down that length to the end of the path shown in the diagram."

6. (Strategy question) Is a calculator necessary to find the length of Kim's path? Explain.

7. (Strategy question/Journal prompt) A calculator is not available.
   a. Explain how the length of Kim's path can be found.
   b. Explain how the length of Kim's path can be found using your knowledge of right triangles.

PROBLEM

The graph shows *h*, the height, in feet, of a model rocket, versus *t*, the time, in seconds, after the rocket is launched.

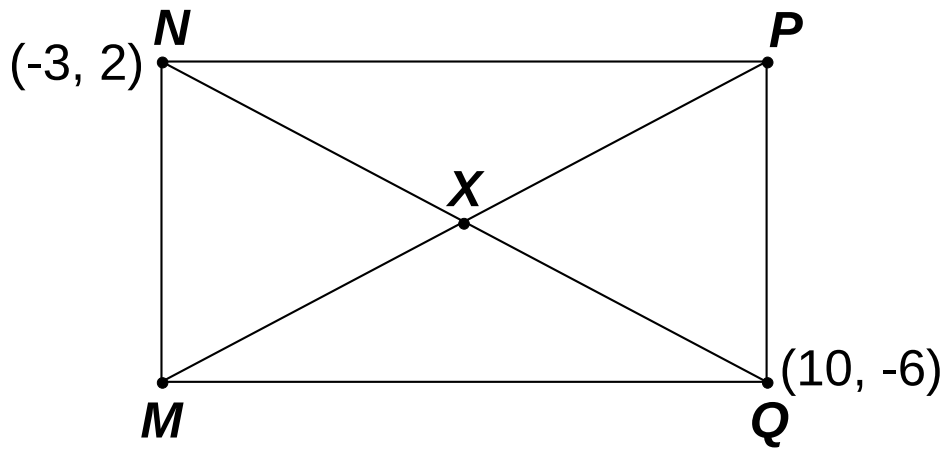
EQUATION

$h(t) = -16t^2 + 48t + 65$

QUESTIONS

1. What is the independent quantity?
2. What is the dependent quantity?
3. How long is the rocket at 60 ft. above the ground?
4. At what time(s) is the rocket at a height of 80 ft. above the ground?
5. What is the maximum height of the rocket?
6. At what time did the rocket reach this maximum height?
7. How long will it take the rocket to reach the ground?

Rectangle *MNPQ* has diagonals that intersect at point *X*.



8. What are the coordinates of point X?

9. What is the length of $\overline{PM}$? $\overline{NQ}$? $\overline{NX}$? $\overline{PX}$?

10. Find the perimeter of rectangle MNPQ.

11. Determine the area of rectangle MNPQ.

12. Determine the area of triangle NMQ.

13. Determine if $\overline{NQ} \perp \overline{PM}$. Explain why or why not.

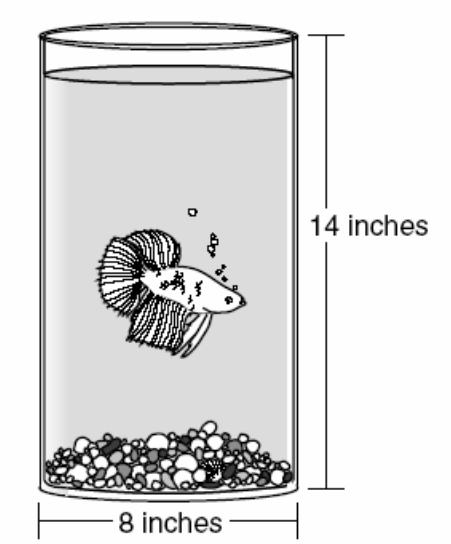
14. If point M is reflected over the line $\overleftrightarrow{PQ}$, state the coordinates of M'

15. If point P is reflected over the line $\overleftrightarrow{MQ}$, state the coordinates of P'

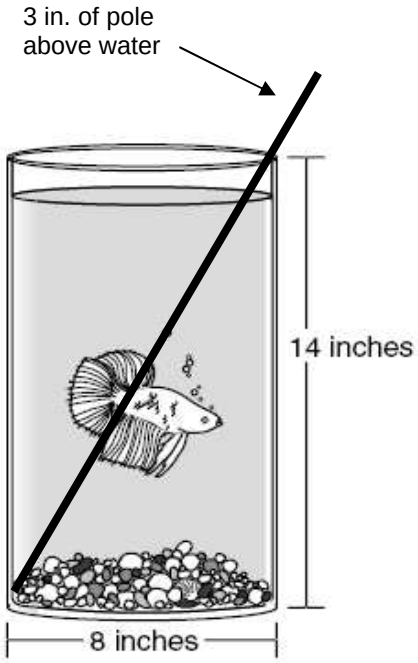
16. If rectangle MNPQ is dilated by a factor of 4, N' =

17. If rectangle MNPQ is dilated by a factor of 2/3, M' =

Steven has a cylindrical fish tank with a diameter of 8 inches and a height of 14 inches. He placed some rocks that took up 50 cubic inches at the bottom of the tank. Then he filled the tank with spring water to 2 inches from the top.



1. Write an expression that could be used to find the volume of water in the tank.
2. What is the approximate volume of the water in the tank?
3. What is the volume of air remaining in the tank?
4. If the rocks were melted together to form a sphere, what would be the approximate radius of the sphere?
5. What is the height of the water in the tank?
6. What is the radius of the cylinder?



7. a. Imagine that a pole falls in the tank at an angle as shown, what is the length of the pole that is inside the tank?
   b. How long is the pole?
   c. What is the length of the part of the pole that is underwater?
   d. What is the angle of inclination of the pole with the base of the cylinder?
   e. What is the slope of the line segment represented by the pole?
   f. What is wrong with the problem as it is written?

8. What happens to the volume if:
   - the diameter is doubled?
   - the height is doubled?
   - both the height and the diameter is doubled?

IN 1998, the enrollment at a community college was approximately 2500 students. In 2002, the enrolment had increased to 3250 students.

1. What was the percent increase from year 1998 to 2002?
2. What do you think is the reason for this increase?
3. Given just these two data, can you approximate what the enrolment figures were in year 2000?
4. If this trend was to continue, predict what the enrolment will be in the year 2010.
5. Construct a possible table of data.
6. Make a scatterplot of the possible enrolment from year 1998 to 2020. Does it make sense to connect these points? EXPLAIN.
7. Is it possible to generate a list of data on the calculator given just these two data points?
8. Write a possible equation that fits these data points.
9. What does the y-intercept mean in this situation?

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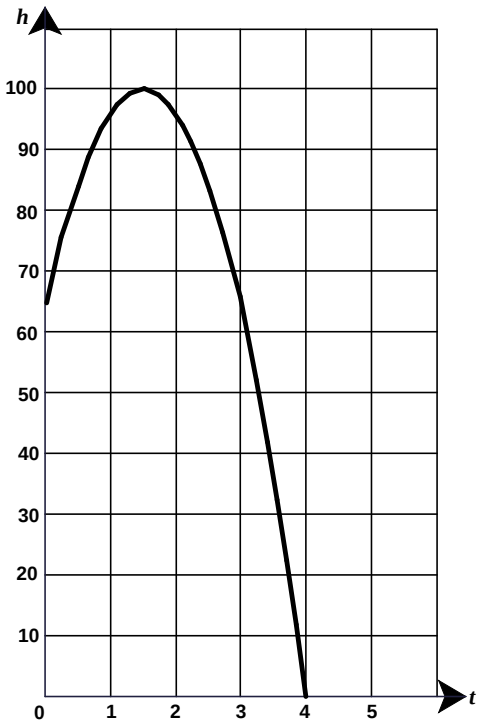

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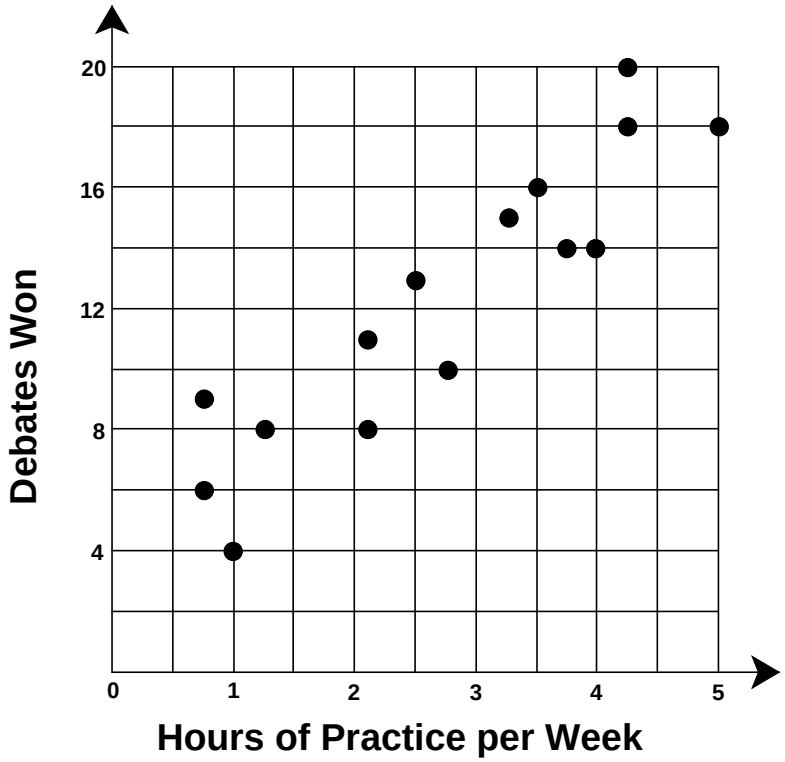
The graph shows the results of a survey a group of debate teams answered about hours of debate team practice and number of team wins.



1. Does the plot show a positive or negative correlation?

2. If you study $0 \leq x \leq 2.5$ hours, how many debates will you expect to win?

3. Draw the line of best fit. Write the prediction equation for this data.

4. Using prediction equation, predict how many debates you can win if you practice 9 hours per week.

5. What is the slope of your line of best fit?

Troy borrowed money from his father so that he could buy a used car. The table shows the remaining balance, *b*, of Troy's loan after each payment.

Number of Payments, *p*	Loan Balance, *b*
1	$3910
2	$3685
3	$3460
4	$3235
5	$3010
6	$2785

Level 1 – Money, Money, Money

Use the table to answer the following questions.

1. Graph the relation.
   (a) Is the relation positive or negative?
   (b) How much money did Troy originally borrow?
   (c) How long (in months) will it take him to pay back the loan?
2. How much money does he pay back with each payment?
3. If Troy works for $6 an hour, how long will he have to work each month to fulfill his monthly obligation to his father?

Level 2 – $$$$$

4. Find the equation of the relation described in the table.
5. What is the rate of change in the table?
   (a) What is the meaning of this rate of change in real life?
   (b) Explain how you can find the rate of change from the table and from a graph.
   (c) How would the graph change if the rate of change would increase?

More $ for your money ...

6. Starting with the 7th payment Troy wants to pay an additional $25 each payment.
   (a) What is the percent increase?
   (b) How would the graph for this relation look like?
   (c) How long will it take him now to pay the full loan back?

7. Starting with the 7th payment Troy wants to increase his payments by 20%.
   (a) How much is the new payment?
   (b) How long will it take after this increase to pay the full loan back?
   (c) How much faster will he be paying the loan back?