
# Graduation-Required Assessment for Diploma

## Mathematics Test Book

**18pt**
**Item Sampler**

Student responses in this test book must be entered by a scribe into an accommodated test form in the Data Entry Interface.



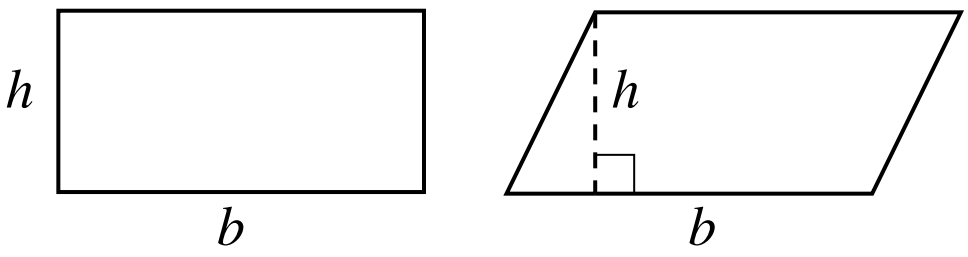
**Minnesota** Department of
Education

# GRAD FORMULA SHEET

**You may use the following formulas to solve problems on this test.**

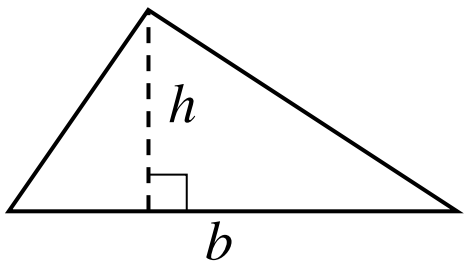
## Area of a Rectangle or a Parallelogram

$A = bh$



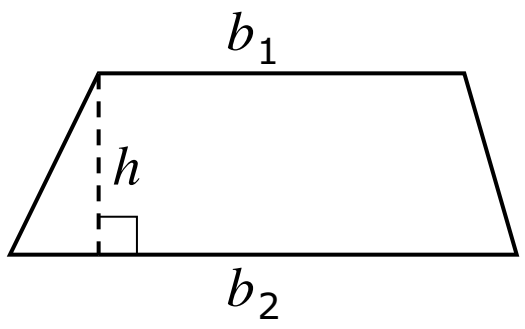

## Area of a Triangle

$A = \frac{1}{2} bh$




## Area of a Trapezoid

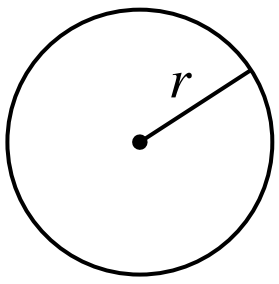
$A = \frac{1}{2} h(b_1 + b_2)$




## Area of a Circle and Circumference of a Circle

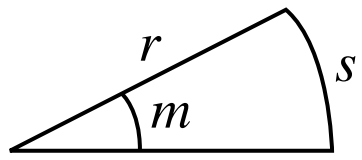
$A = \pi r^2$

$C = 2\pi r$



## Length of an Arc of a Circle and Area of a Sector of a Circle

$$s = \frac{m}{360} C$$

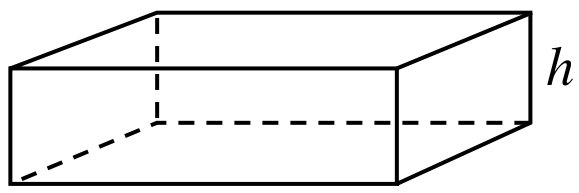



$$A_{\text{sector}} = \frac{m}{360} \pi r^2$$

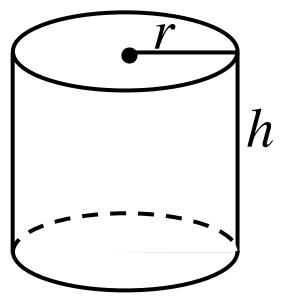
where $m$ is the angle measure in degrees

## Volume of a Prism or a Cylinder

$$V = Bh$$




where $B$ is the area of the base




## Pythagorean Theorem

$$a^2 + b^2 = c^2$$

## Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

## Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

## Trigonometric Relations

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

6

## Graduation-Required Assessment for Diploma (GRAD)
## General Directions

- You are now going to take the Minnesota Graduation-Required Assessment for Diploma (GRAD).
- All students who first entered grade 8 in 2005-2006 or later are required to meet the GRAD requirements in order to receive a diploma from a Minnesota public high school.
- If you are taking the reading test, read each passage.
- You must answer each question.
- You may take notes and highlight in your test book.
- You may write in this test book or use scratch paper. All answers must be marked in this test book.
- When you finish the test, stop and check your answers.
- Turn the page to begin the GRAD test.

**Go on to the next page.**

**1.** Samantha has started filling the birdfeeders at school. The number of cups of birdseed she needs to finish filling the feeders is given by the expression $15\frac{3}{4} - 2\left(\frac{1}{2} + \frac{3}{4}\right)$. How many cups of birdseed does she need to finish filling the feeders?

**A.** $10\frac{1}{2}$

**B.** $13\frac{1}{4}$

**C.** $13\frac{1}{2}$

**D.** $15\frac{1}{2}$

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**2.** A real estate agent earns a 6% commission on properties that she sells. If she sells a property for more than $300,000, she earns an additional 2% commission on the amount over $300,000. What is her total commission when she sells a property for $500,000?

**A.** $22,000
**B.** $30,000
**C.** $34,000
**D.** $40,000

**3.** The price of a set of tires at Tire Mart is $420.00. One payment plan is to make monthly payments of $39.50 for a year. Customers who choose this payment plan pay interest. What percent of the price of the tires is the interest?

**A.** 8.3%

**B.** 9.4%

**C.** 11.4%

**D.** 12.9%

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**4.** A 3-ounce piece of fish contains about $\frac{1}{4}$ of the recommended daily amount of protein for an adult female. There are 13 grams of protein in the 3-ounce piece of fish. What is the recommended daily amount of protein for an adult female?

**A.** 3.25 grams

**B.** 12 grams

**C.** 39 grams

**D.** 52 grams

**5.** What is the slope of the graph of $2x - 3y = 6$?

**A.** $-2$

**B.** $-\frac{2}{3}$

**C.** $\frac{2}{3}$

**D.** 2

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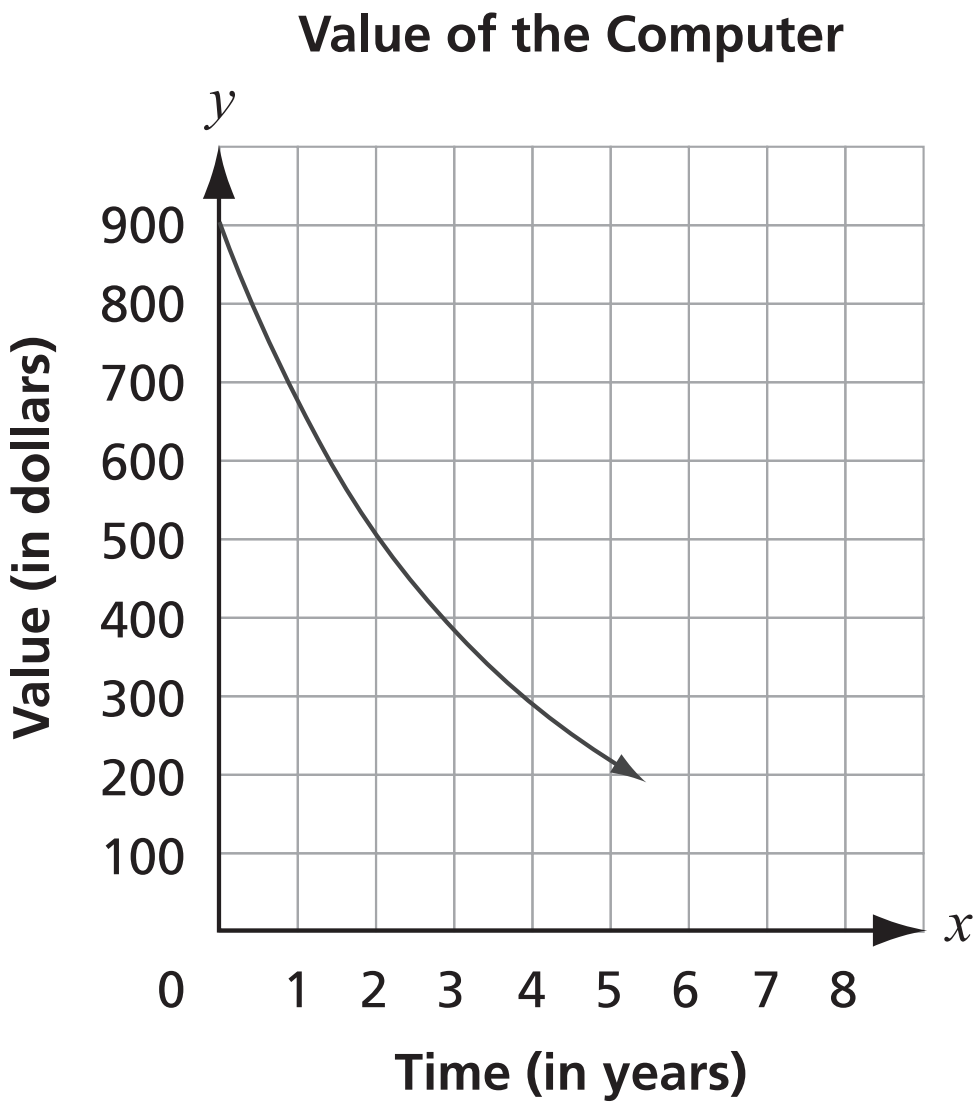


**6.** Dan bought a new computer for $900. Each year, the value of the computer decreased by 25% of the previous year's value. At this rate, what can Dan expect the approximate value of the computer to be after 8 years?

**A.** $84

**B.** $90

**C.** $100

**D.** $113



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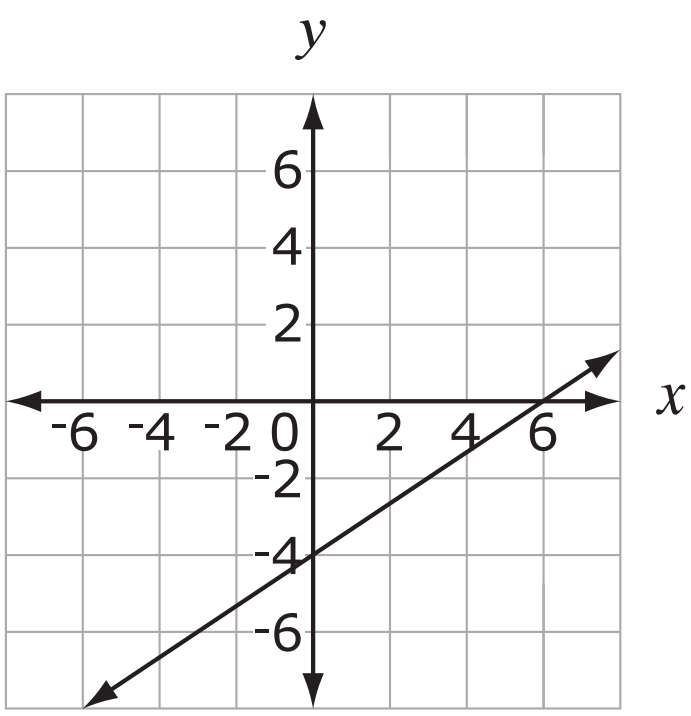
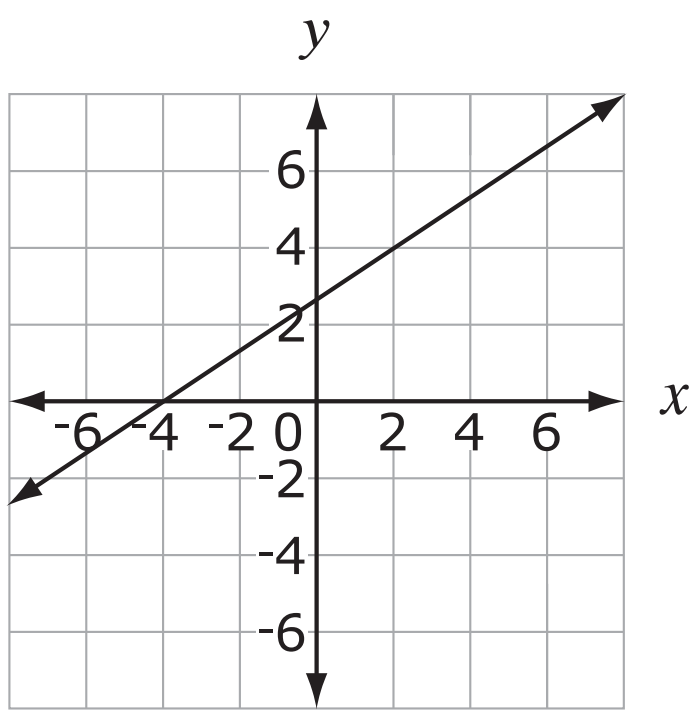
**7.** Which graph represents the equation $y = \frac{2}{3}x - 4$?

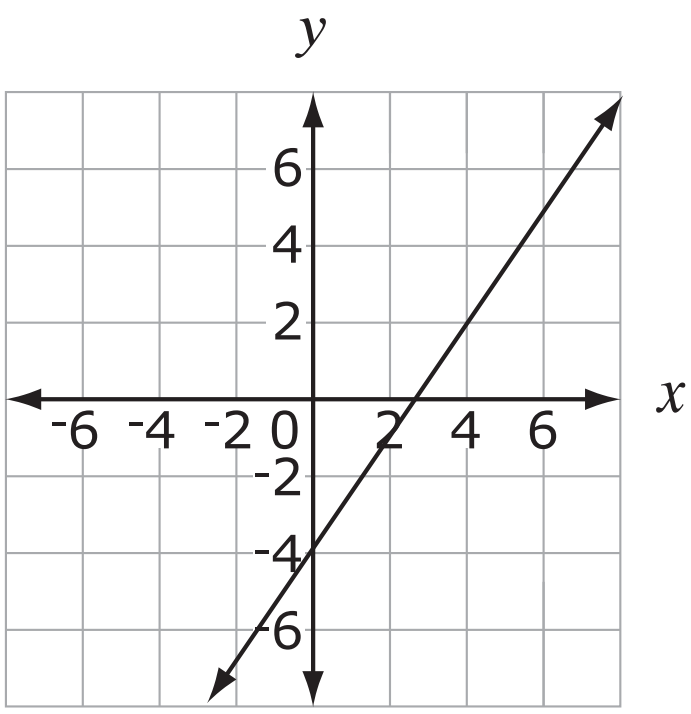
**A.**



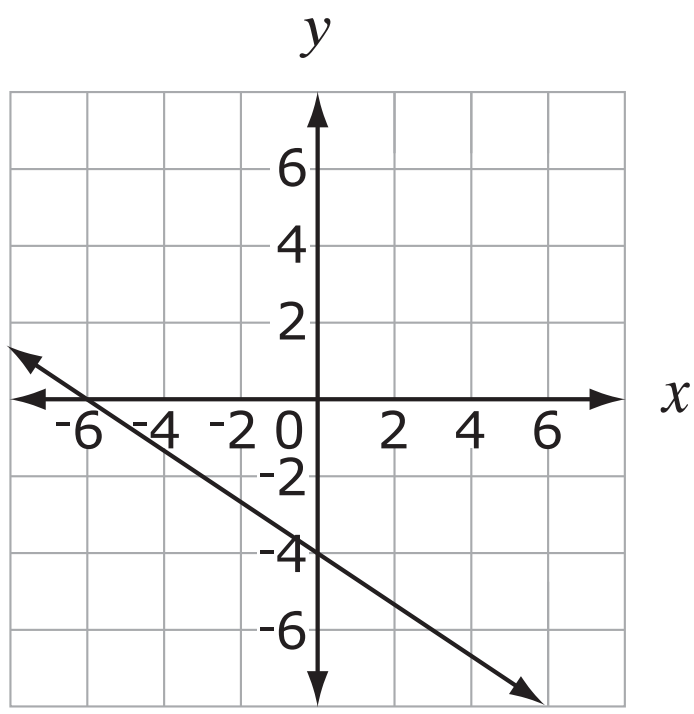

**B.**




**C.**




**D.**

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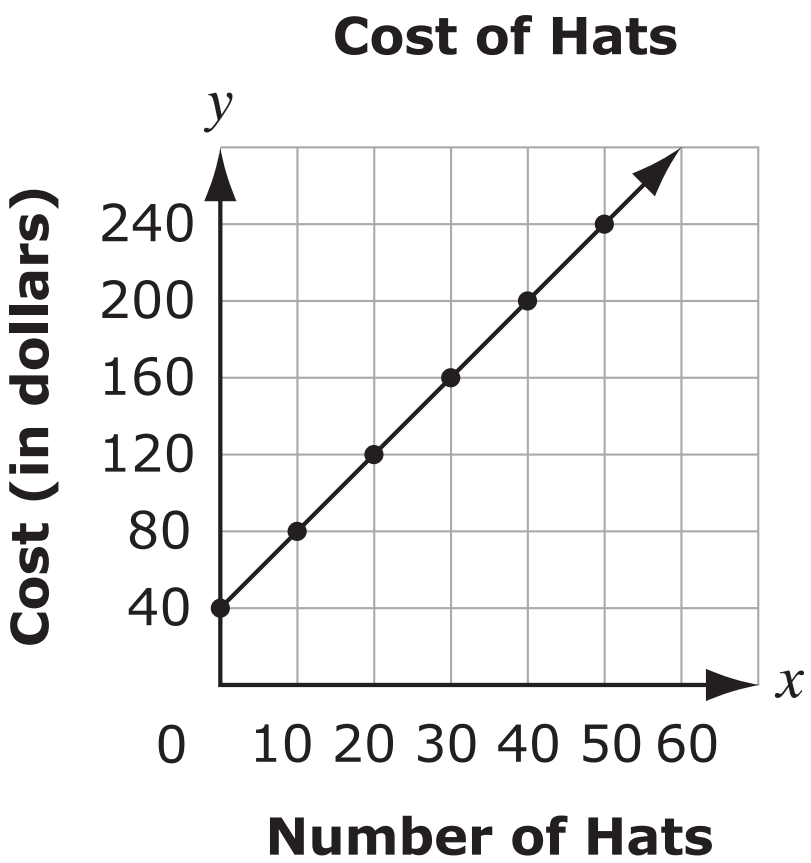


**8.** Ann's school wants to purchase hats to sell at the school store. The company that sells the hats charges an initial contract fee plus an amount for each hat. If the graph continued, how much would it cost the school to purchase 150 hats?

**A.** $28

**B.** $640

**C.** $720

**D.** $1,200



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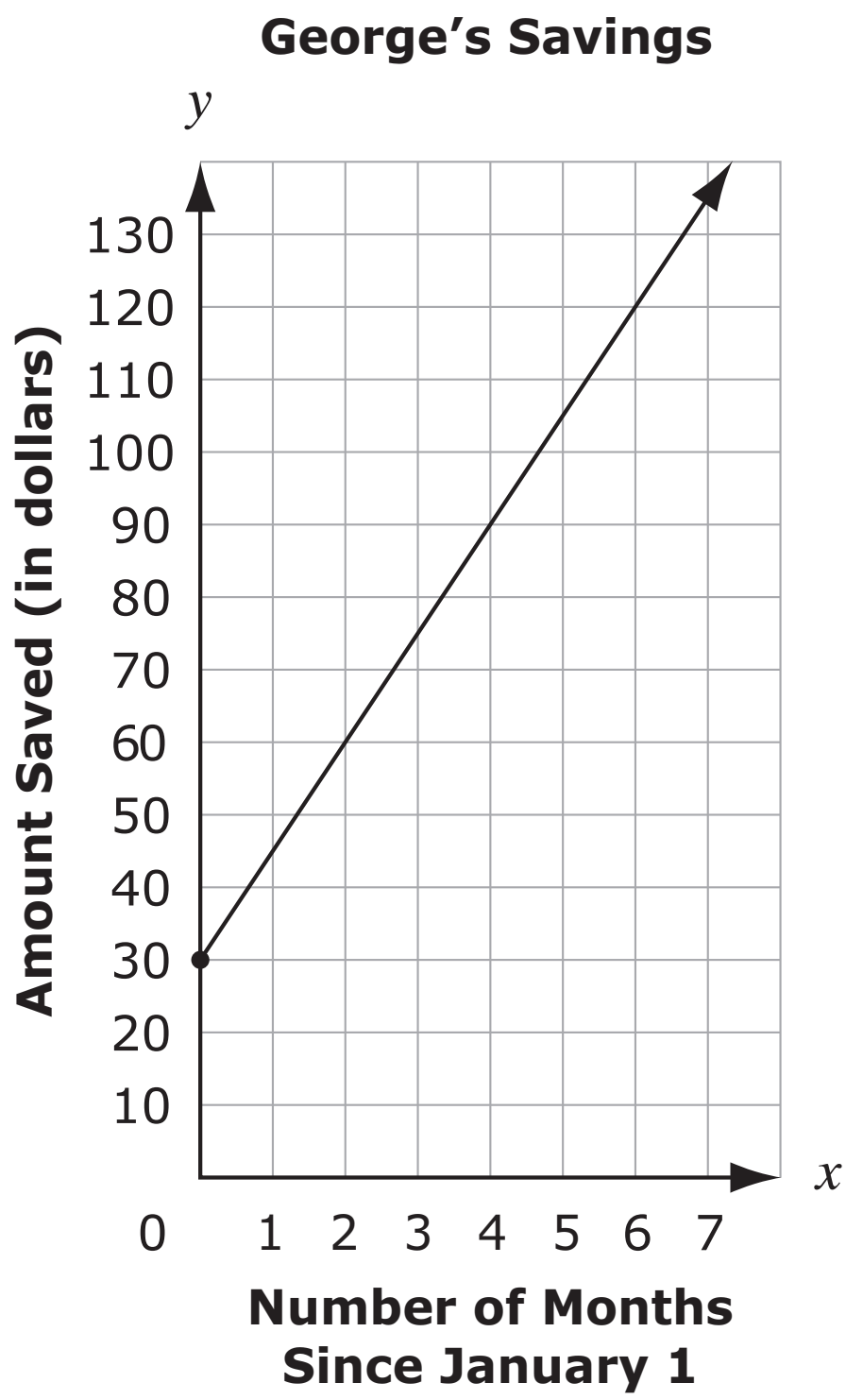
**9.** The profit Susan earns for making and selling $x$ necklaces is represented by $10x - (4x + 27)$. Which expression is equivalent to $10x - (4x + 27)$?

**A.** 33

**B.** $-21x$

**C.** $6x + 27$

**D.** $6x - 27$




**10.** The graph models the amount of money George has saved. Which equation models the same relationship?

**A.** $y = \frac{3}{2}x + 30$

**B.** $y = 15x + 30$

**C.** $y = 30x + \frac{3}{2}$

**D.** $y = 30x + 15$



**Go on to the next page.**

**11.** What is the solution to $-3(4x + 7) = 5x + 6$?

**A.** $-\frac{27}{17}$

**B.** $-\frac{27}{7}$

**C.** $\frac{1}{17}$

**D.** $\frac{15}{17}$

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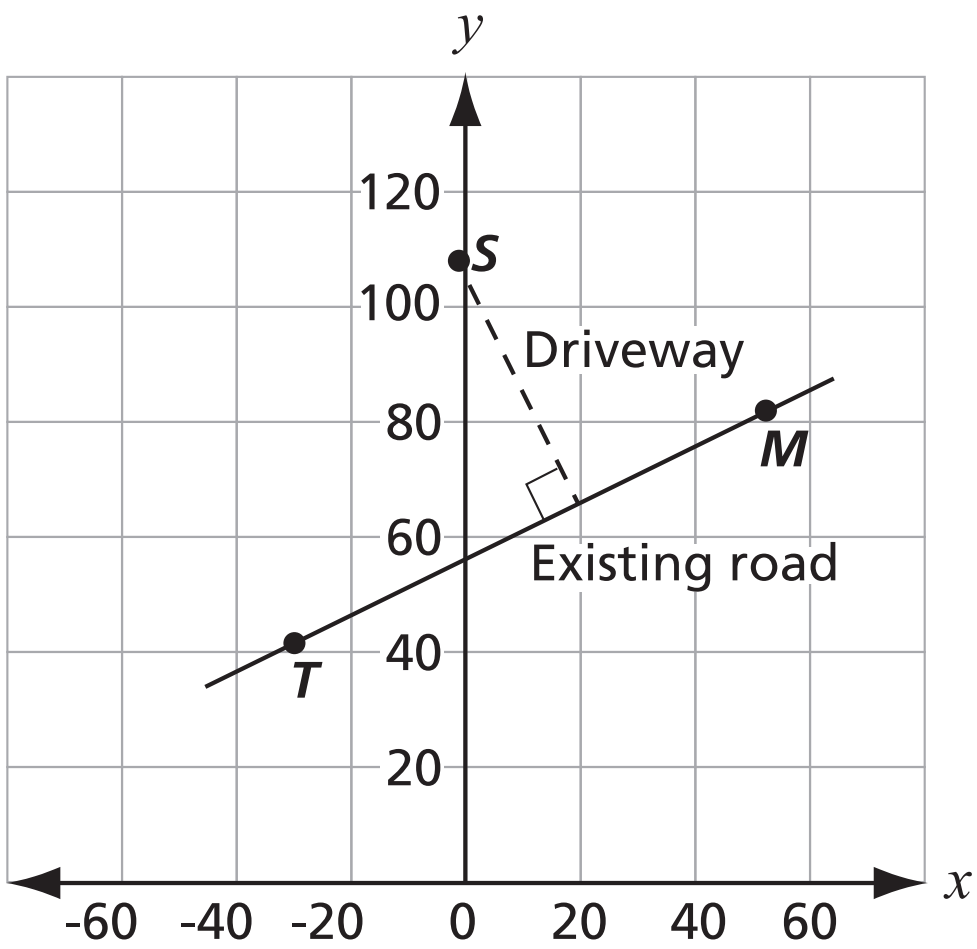
**12.** The area of a rectangular room is 192 square feet. Using $x$ for the length of the room, the equation $x^2 - 4x = 192$ can be solved to determine the dimensions of the room. What is the length of the room?

**A.** 12 feet

**B.** 16 feet

**C.** 32 feet

**D.** 48 feet




**13.** House T at $T(-30, 42)$ and house M at $M(52, 82)$ are located along an existing road. House S is located at $S(-2, 108)$. The owners of house S need to build a driveway perpendicular to the existing road. What is the slope of the line that represents the driveway from house S perpendicular to the existing road?

**A.** $-\frac{41}{20}$

**B.** $-\frac{20}{41}$

**C.** $\frac{20}{41}$

**D.** $\frac{41}{20}$



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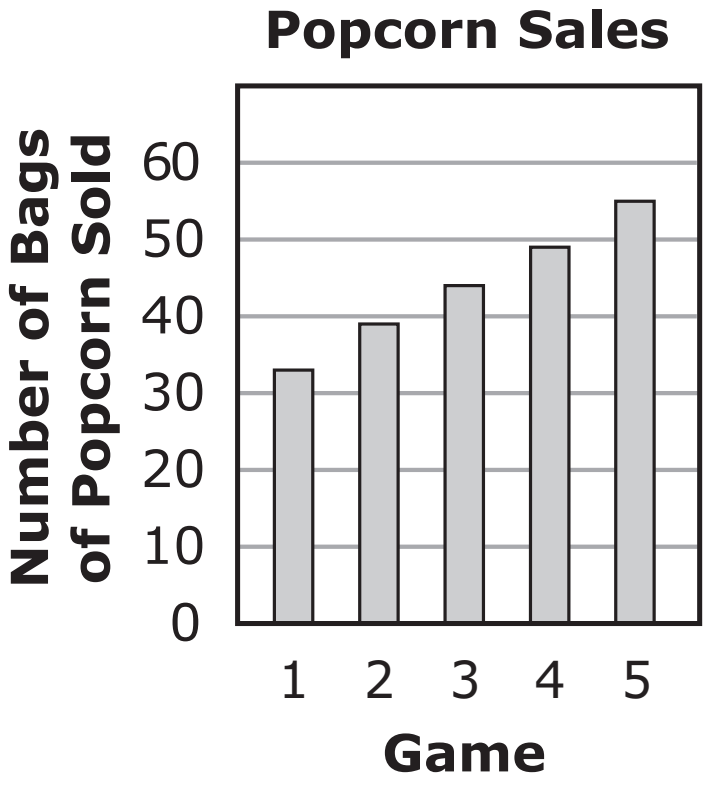
**14.** Sharon drove 500 miles from college to her parents' house in 10.3 hours. She drove the same distance from her parents' house back to college. The average speed of her trip back to college was 5 miles per hour faster than the trip to her parents' house. To the nearest tenth, how many hours was the trip back to college? (Use $d = rt$.)

**A.** 5.3

**B.** 9.3

**C.** 10.4

**D.** 11.5




**15.** The graph shows the number of bags of popcorn sold at each of 5 baseball games. If the trend shown in the graph continues, how many bags of popcorn will be sold at game 8?

**A.** 61

**B.** 66

**C.** 71

**D.** 76

**Go on to the next page.**

**Basketball**
**Points Scored**

| | |
|---|---|
| 45 | 61 |
| 58 | 52 |
| 52 | 47 |
| 57 | 54 |
| 49 | 55 |

**16.** Which 2 measures are the same for the data?

**A.** Mean and median
**B.** Mean and mode
**C.** Median and mode
**D.** Mode and range

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**17.** Albert knows that the probability of being assigned homework in his first period class is 40%. He knows that the probability of being assigned homework in his second-period class is 25%. What is the probability that Albert will be assigned homework in both classes?

**A.** 10%
**B.** 15%
**C.** 35%
**D.** 65%



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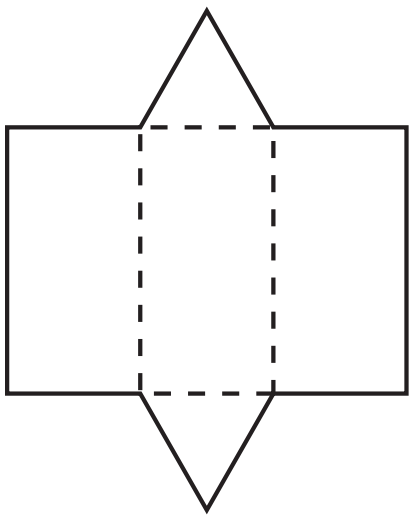
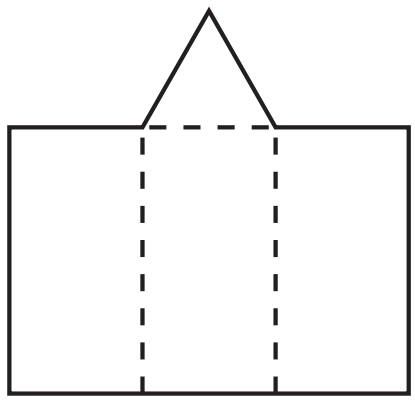
**18.** Which figure is the net of a rectangular pyramid?

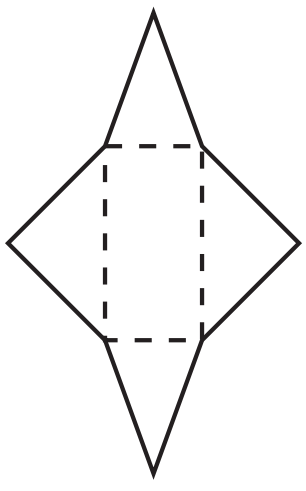
**A.**



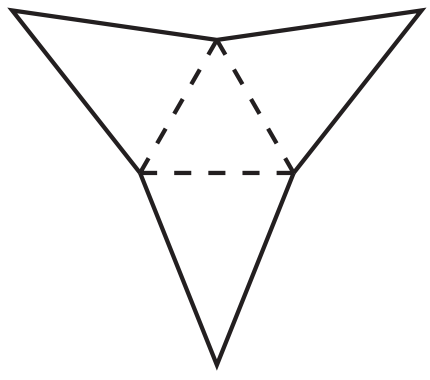
**B.**



**C.**



**D.**



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**19.** Javier has a bag that contains 1 blue tile, 1 red tile, 1 yellow tile, and 1 green tile. He picks 1 tile from the bag 3 times, replacing the tile each time. What is the probability that he picks the blue tile exactly 2 times?

**A.** $\frac{1}{64}$

**B.** $\frac{3}{64}$

**C.** $\frac{9}{64}$

**D.** $\frac{2}{3}$

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**20.** Marta is creating a scale drawing of a triangular park. The actual sides of the park measure 111 m, 222 m, and 280 m. She starts drawing her map by sketching 2 sides of a triangle measuring 111 mm and 222 mm. The third side of the park should be represented by a 280 mm long line, but when Marta measures the third side on her map, it is only 200 mm. What should she have done before drawing the sides of the park on her map?

**A.** Measured the sides of the park more carefully

**B.** Used a different scale to make the triangle fit

**C.** Used the measure of the angle between the first 2 sides of the park and drawn an angle congruent to that angle between the first 2 sides on her map

**D.** Used the measure of the angle between the first 2 sides of the park and drawn an angle proportional to the ratio of the scale drawing between the first 2 sides on her map



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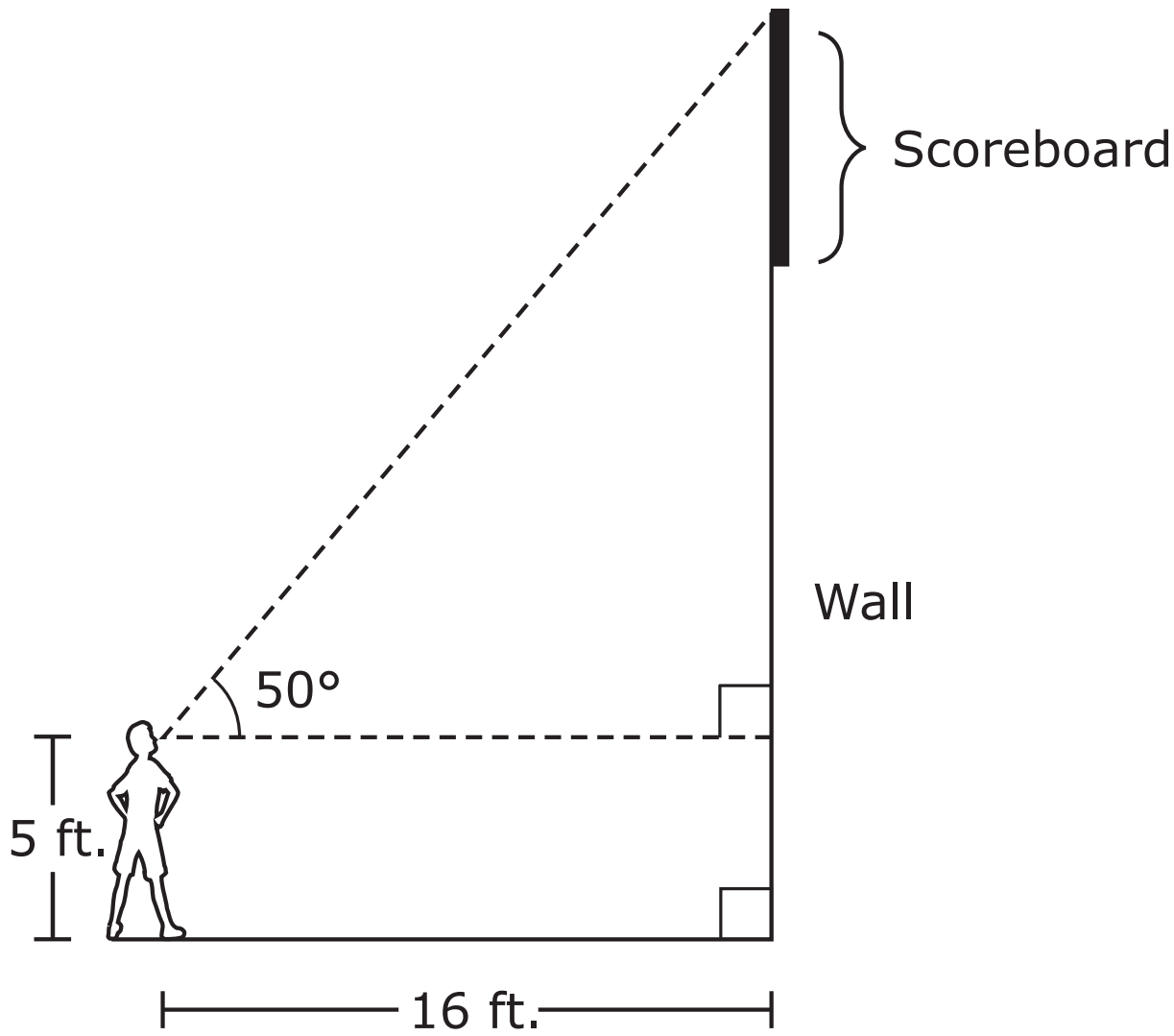


| | sin | cos | tan |
|---|---|---|---|
| 50° | 0.766 | 0.643 | 1.192 |

**21.** Latisha stands 16 feet from a wall where a scoreboard hangs. From 5 feet above the floor, the angle of elevation to the top of the scoreboard is 50°. To the nearest tenth of a foot, how far above the floor is the top of the scoreboard?

**A.** 15.3 feet

**B.** 17.3 feet

**C.** 19.1 feet

**D.** 24.1 feet

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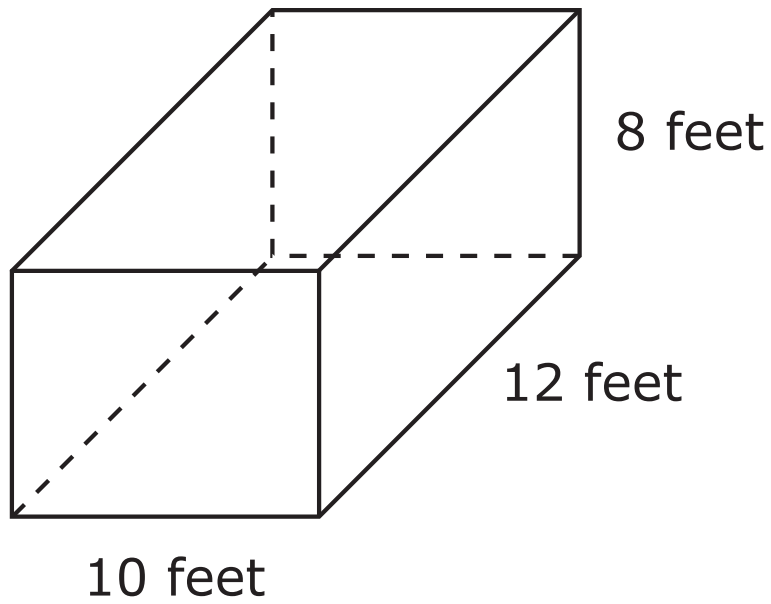


**22.** What is the surface area of the rectangular prism?

**A.** 296 square feet
**B.** 352 square feet
**C.** 592 square feet
**D.** 960 square feet

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# GRAD
# MATHEMATICS
# Item Sampler
# 18pt