# 2005 Washington State Math Championship

Unless a particular problem directs otherwise, give an exact answer or one rounded to the nearest thousandth.

Algebra - Grade 5

1. A particular ball retains $\frac{1}{2}$ of its height on each bounce when dropped from a height of 128ft. Give the height of the ball on the fifth bounce after being dropped?

2. If $3 \phi\ 8 = 48$, $6 \phi\ 7 = 84$, and $5 \phi\ 3 = 30$, what would be the value of $\dfrac{9\phi3 + 3\phi9}{3\phi2}$

3. If James makes a round trip to a town 45 miles away and returns in one and a half hours, what is his average speed in feet per second? Round your answer to the nearest   hundredth foot. (1 mile = 5280 feet)

4. A piece of rope 27 meters long is cut into two pieces so that one piece is four-fifths as long as the other. Find the percent decrease of the whole length down to the longer piece. Answer must use the "%" symbol correctly.

5. You are planning a party and need to buy supplies. Party hats cost $.30, bells $.50, and plates $.25. Assume each person coming to the party will receive one of each item. You have $40 dollars to spend. How much change will you have left over if you invite the maximum number of people possible?

6. If each side of each square were 1 matches long, how many matches would the 10th figure contain?
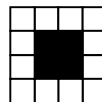
7. Write an equation in $y = mx + b$ form for the following table.

X	-8	-2	4	10	16	22
Y	-95	-65	-35	-5	25	55

8. At a business meeting, 15 people are meeting for the first time. If they all shake hands only once each, how many total handshakes will occur?

9. Before money was established, people used to barter (trade) for goods. In the past a villager might have had the following trade requirements of: 10 chickens = 4 sheep, 6 sheep = 1 horse, and 1 cow = 2 horses. You have two extra cows for trade to acquire sheep and chickens. How many sheep will you have if you want 25 chickens?

10. Ben Thayer and Anne Back each hike to the top of a mountain and back by the same route. How much faster in feet per second did Ben travel for the last 200 feet (3800-3600ft) if Anne's time at 3800ft is 4.75 hours, Ben's time at 3800 is 5.75 and they both finished at 6.25 hours?


Elevation in feet vs. Time (hours) after Anne starts to

Ben ——
Ann ———
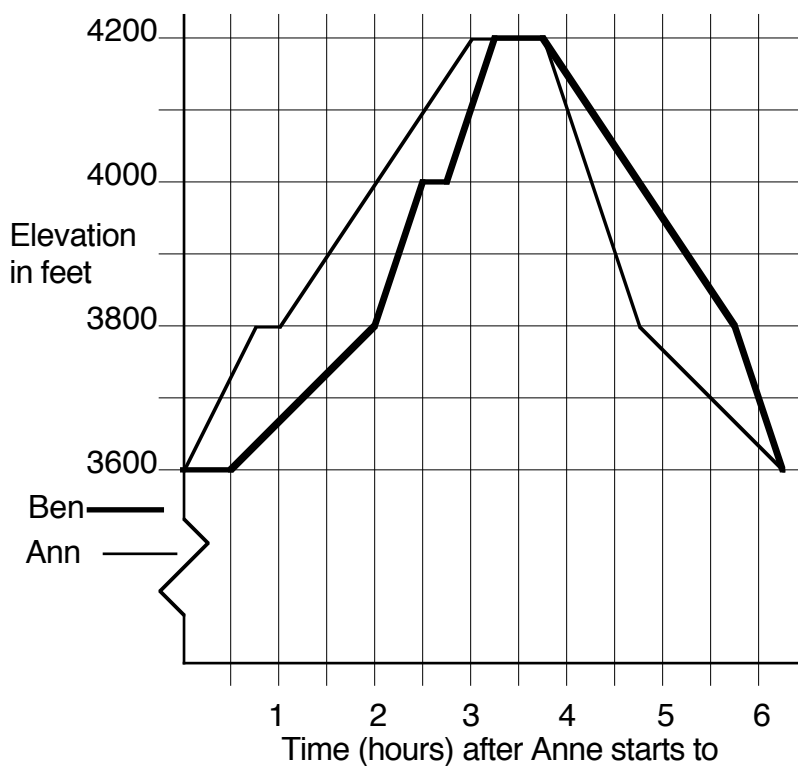
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Algebra - Grade 6

1. A piece of rope 27 meters long is cut into two pieces so that one piece is four-fifths as long as the other. Find the percent decrease of the whole length down to the longer piece. Answer must use the "%" symbol correctly.

2. You are planning a party and need to buy supplies. Party hats cost $.30, bells $.50, and plates $.25. Assume each person coming to the party will receive one of each item. You have $40 dollars to spend. How much change will you have left over if you invite the maximum number of people possible?

3. If each side of each square were 1 matches long, how many matches would the 10th figure contain?
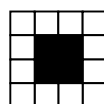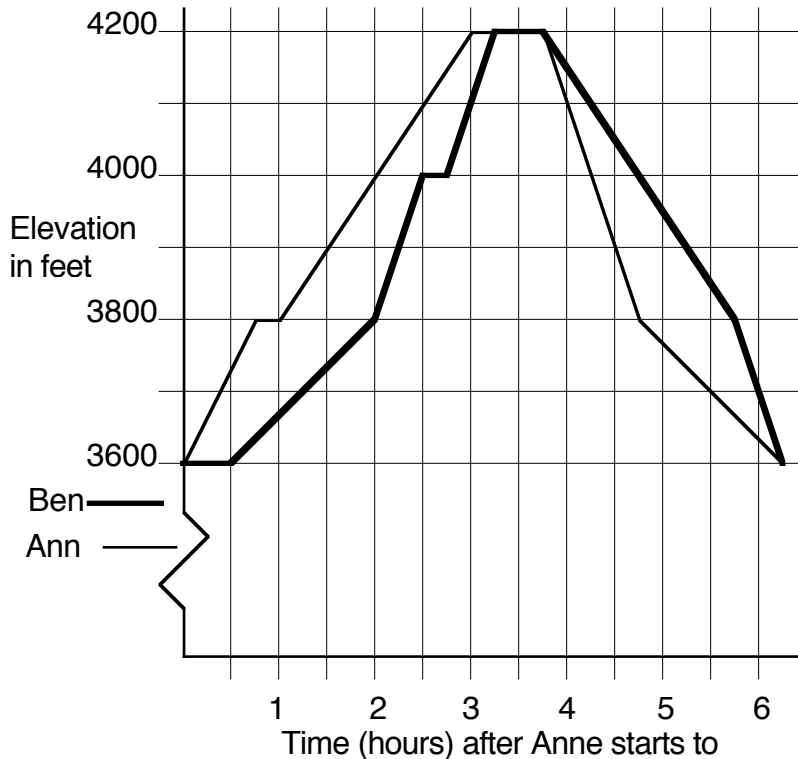

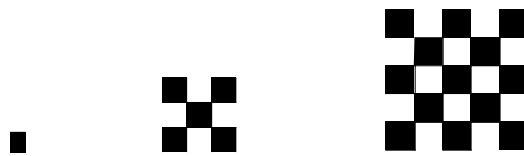4. Write an equation in $y = mx + b$ form for the following table.

X	-8	-2	4	10	16	22
Y	-95	-65	-35	-5	25	55

5. At a business meeting, 15 people are meeting for the first time. If they all shake hands only once each, how many total handshakes will occur?

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7. Ben Thayer and Anne Back each hike to the top of a mountain and back by the same route. How much faster in feet per second did Ben travel for the last 200 feet (3800-3600ft) if Anne's time at 3800ft is 4.75 hours, Ben's time at 3800 is 5.75 and they both finished at 6.25 hours?

Elevation in feet
4200
4000
3800
3600

Ben———
Ann ———

1   2   3   4   5   6
Time (hours) after Anne starts to

8. How many black squares are needed for the 10th picture given the first three below?

9. 2b or not 2b: if $\dfrac{a+b}{c(e-d)} = \dfrac{b(f+g)}{hj}$, what is the value of b's opposite?

$a = 3\dfrac{2}{3}$ $c = -2$ $d = 5$ $e = 4$ $f = \dfrac{2}{8}$ $g = \dfrac{6}{8}$ $h = 1$ $j = 3^2$

10. 4. Greeney Thumbe noticed the weeds in her garden were growing rapidly. She checked on Sunday that there were 24 weeds. Wednesday she noticed that they were growing at a rate of 20% per day, but she didn't have a chance to weed until Saturday evening. How many weeds did she have to pull on Saturday evening? (Round your answer to the nearest weed.)

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Algebra - Grade 7

1. Write an equation in $y = mx + b$ form for the following table.

X	-8	-2	4	10	16	22
Y	-95	-65	-35	-5	25	55

2. At a business meeting, 15 people are meeting for the first time. If they all shake hands only once each, how many total handshakes will occur?

3. Before money was established, people used to barter (trade) for goods. In the past a villager might have had the following trade requirements of: 10 chickens = 4 sheep, 6 sheep = 1 horse, and 1 cow = 2 horses. You have two extra cows for trade to acquire sheep and chickens. How many sheep will you have if you want 25 chickens?

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Elevation in feet

Ben———
Ann ———

Time (hours) after Anne starts to
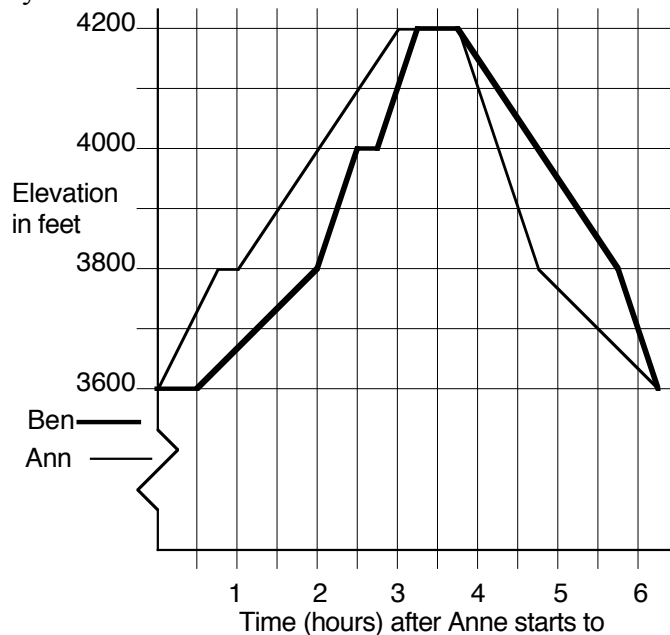
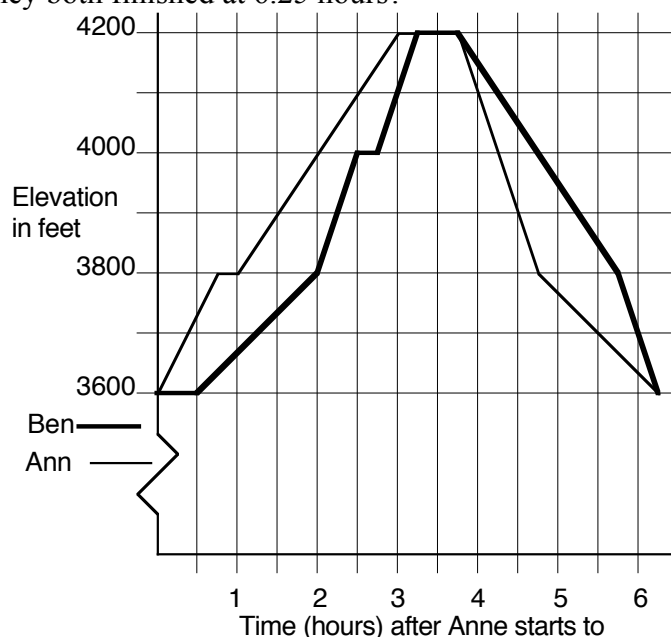5. How many black squares are needed for the 10th picture given the first three below?
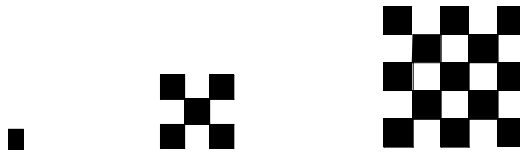
6. 2b or not 2b: if $\dfrac{a+b}{c(e-d)} = \dfrac{b(f+g)}{hj}$, what is the value of b's opposite?

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7. 4. Greeney Thumbe noticed the weeds in her garden were growing rapidly. She checked on Sunday that there were 24 weeds. Wednesday she noticed that they were growing at a rate of 20% per day, but she didn't have a chance to weed until Saturday evening. How many weeds did she have to pull on Saturday evening? (Round your answer to the nearest weed.)

8. A college student is managing her monthly income. She plans on saving 25% of her earnings, spending 0.2 of earnings on clothing needs, and 1/6 must go for transportation. The remainder will go towards entertainment. If she has 60 dollars for entertainment, how much money did she earn that month?

9. A hiking party averages 16 miles per day over a 3-day leg of the hike. The first day was very steep and slow, however day two was much faster resulting in 2 miles over twice the mileage of day one. Day three was even better with the group ending the day just 2 miles short of tripling day one. If the group can maintain the rate of day 2, how many days will it take the party to finish the remaining 54miles?

10. Two cities are 800 miles apart. There is only one set of tracks that connect the two cities, but two trains going opposite ways need to use the track. A cargo train leaves town A at 40 mph, 30 miles outside of town. A passenger train leaves town B at 70 miles per hour. Tracks are expensive to put down so you only have four miles of track to use for a bypass track. How far from town B do you need to start the bypass if you want 2 miles leeway on each side of the point the two trains would impact?

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Algebra - Grade 8

1. Ben Thayer and Anne Back each hike to the top of a mountain and back by the same route. How much faster in feet per second did Ben travel for the last 200 feet (3800-3600ft) if Anne's time at 3800ft is 4.75 hours, Ben's time at 3800 is 5.75 and they both finished at 6.25 hours?

2. How many black squares are needed for the 10th picture given the first three below?
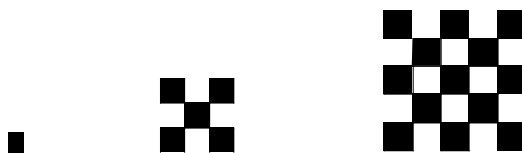
3. 2b or not 2b: if $\dfrac{a+b}{c(e-d)} = \dfrac{b(f+g)}{hj}$, what is the value of b's opposite?

$a = 3\dfrac{2}{3}$ $c = -2$ $d = 5$ $e = 4$ $f = \dfrac{2}{8}$ $g = \dfrac{6}{8}$ $h = 1$ $j = 3^2$

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8. On day 2 of a road trip, interstate driving has allowed you to travel a constant speed both days. After 3 hours on day 2 you have traveled a total (both days) of 1020 miles, and after 7 hours you have traveled a total distance of 1300 miles. How many miles did you drive on day one?

9. The height of a bridge cable above the road is directly proportional to the square of the distance from the center of the bridge. Forty feet from the center of the bridge the cable is 12 feet above the road. How far above the road is the cable if you are 75 feet from the center of the bridge to the nearest foot?

10. Honeybees have interesting family trees. Male bees hatch from unfertilized eggs, so they have a mother, but no father. However, females are born from fertilized eggs resulting in both a mother and a father. A male just born represents the first generation. How many male honeybees are in the 10th generation?

$$\begin{array}{cccc} & M & & 1^{st}\ generation \\ & F & & 2^{nd}\ generation \\ M & & F & \\ F & M & F & \end{array}$$