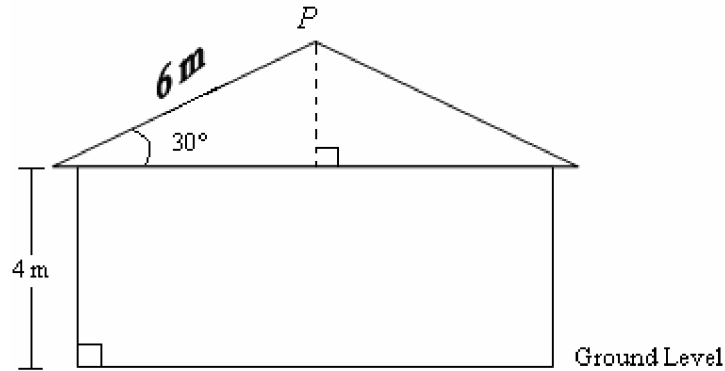**MULTIPLE CHOICE**

1. The diagram below shows the side view of a house. The base of its roof is 4 meters above ground level. Point P is the highest point on the roof.

What is the distance from **P** to ground level?

a.	6 m	c.	10 m
b.	7 m	d.	13 m

ANS: B
We need to find the height of the roof and then add this to the height of the floor (4m)
The side opposite the 30° angle is half the length of the hypotenuse - given here as 6m.

So the height of the roof is $\frac{6\ m}{2} = 3\ m$.

The total height is: $4\ m + 3\ m = 7\ m$.

PTS: 1   DIF: Grade 10   REF: GS 01
KEY: right triangles, basic angles, trigonometry, geometric sense
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #1

2. The stem-and-leaf plot shows the scores on Mr. Smith's history exam.

Exam Scores

5	8
6	2 7
7	0 3 3 6
8	4 5 5
9	2 2 2 4 7
10	0

Key

$6 \mid 2$ represents 62

Which of the following measures of the data is largest value?
a. mean
b. median
c. mode
d. range

ANS: C
It is easiest to find the range and mode on a stem-and-leaf plot, so we will find these first.

The **range** is the highest (last) minus the lowest (first) so: range=100-58=42.

To find the **mode** we look for repeating data in a row - in the fourth row "2" repeats itself 3 times, so: mode=92.

Because this number is so much larger than the "average" data, one can conclude here that the mode will be larger than both the mean and the median.

So the mode is the largest value in **this** stem-and-leaf plot.
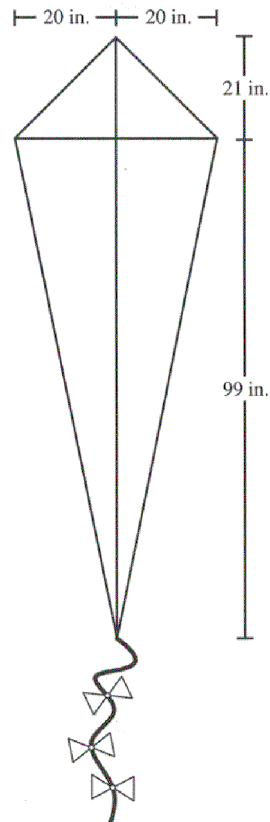
PTS: 1   DIF: Grade 10   REF: PS 02
KEY: stem-and-leaf, plot, mean, media, mode, range, statistics
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #2

3. A kite has perpendicular diagonals with the measures shown in the drawing below.

What is the perimeter, in inches, of the kite?

a. 130   c. 260
b. 165   d. 310

ANS: C
To find the perimeter, we will need to find the length of the sides of the kite using Pythagoras' theorem twice:

$$a = \sqrt{20^2 + 21^2} = \sqrt{881} = 29$$
$$b = \sqrt{20^2 + 99^2} = \sqrt{10201} = 101$$

$$P = 2a + 2b = 2 \cdot 29 + 2 \cdot 101 = 58 + 202 = 260$$

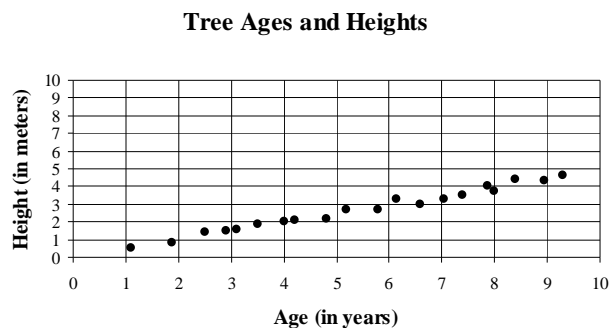$$P = 260 \text{ in.}$$

PTS: 1   DIF: Grade 10   REF: ME 03
KEY: pythagoras, pythagoras' theorem, measurement sense, kite, diagonals
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #3

4. The scatter plot shows the ages and heights of 20 trees on a tree farm.
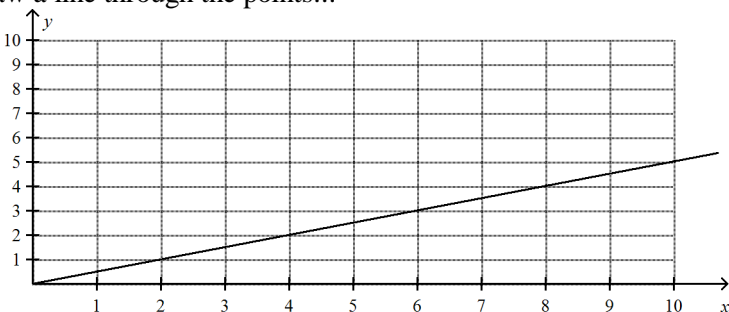
Tree Ages and Heights

Let x = age in years and y = height in meters.

Which of the following equations best approximates the best fitted line for this scatter plot?

a. $y = 1/2x$ c. $y = 2x$
b. $y = 1/2x + 5$ d. $y = 2x + 5$

ANS: A
Draw a line through the points...

This line passes through (0,0) so the y-intercept is 0 - so answers (b) and (d) are not correct.
The line passes through (10,0) which satisfies (a), but not (c).
So the answer is (a).

Or you can find the equation of the line passing through (0,0) and (10,0).
P.S. Do NOT visually observe the slope of this line - the scale on the axis is NOT the same.

PTS: 1   DIF: Grade 10   REF: PS 03
KEY: scatter plot, approximation, linear equation, linear function, intercepts, slope, ps, ap
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #4

5. The table below separates the number of students majoring in math/science from students pursuing other majors at a state college.

Students' Majors by Class				
	Freshmen	**Sophomores**	**Juniors**	**Seniors**
Math/Science Majors	260	310	200	330
Other Majors	1390	1510	1450	1550

What percent of the math/science majors are **seniors**?

a. 43%   c. 21%

b. 30%   d. 5%

ANS: B

Students' Majors by Class				
	Freshmen	Sophomores	Juniors	**Seniors**
Math/Science Majors	**260**	**310**	**200**	**330**
Other Majors	1390	1510	1450	1550

Math/Science majors are in the first row.

There is a total of: 1100

Of these, 330 are seniors.

So the percent is: $\frac{330}{1100} = \frac{30}{100} = 30\%$.

PTS: 1   DIF: Grade 10   REF: NS 02

KEY: percentages, fractions, simplifying, tables, ns

MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1 Assessment Q #5

6. Kelly wants to buy a tool set that is on sale at a hardware store. The price of each tool set will be decreased by 8% each morning just before the store opens. The sale will last for 7 days, or until all the sets are sold.

After the first reduction on Monday, the price of each set was $135.

Kelly wants to wait until the first day that the price is $100 or less.

On which day should she buy her tool set, if one is still available?

a. Wednesday
b. Thursday

c. Friday
d. Saturday

ANS: C
An 8% discount means that the price on the next day is 100%-8%=92% of the price on the previous day.

Make a table by multiplying each successive price by 92%.
Stop multiplying when the price is less than $100.

Mon	Tue	Wed	Thur	Fri	Sat	Sun
$135	$135 \cdot 92\%$ $= \$124.20$	$114.26	$105.12	$96.71		

She should buy the set on Friday.

PTS: 1   DIF: Grade 10   REF: MC 01
KEY: percentages, discounts, money, mc, word problem
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #6

7. On a history test, 20 students received an A and 12 students received a B.

What is the correct ratio of students receiving an A to students receiving a B?
a. 3 to 2
b. 4 to 3

c. 5 to 3
d. 5 to 4

ANS: C
Ratio is: 20 to 12

We reduce the corresponding fraction: $\dfrac{20}{12} = \dfrac{5 \cdot 4}{3 \cdot 4} = \dfrac{5}{3}$

The reduced ratio is: 5 to 3.

PTS: 1   DIF: Grade 10   REF: NS 02
KEY: ratios, fractions, simplifying, cancellation, ns
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #7 Edited slightly

8. Vance charges $19.50 each time he mows his neighbor's lawn.

What is the approximate number of times Vance will have to mow his neighbor's lawn in order to earn $178.00 to purchase a mountain bike?

a. 9 times   c. 20 times
b. 12 times   d. 25 times

ANS: A

Vance needs about $180 and he charges about $20.

He will need to mow the lawn approximately $\frac{\$180}{\$20}$ = 9 times.

PTS: 1   DIF: Grade 10   REF: NS 05
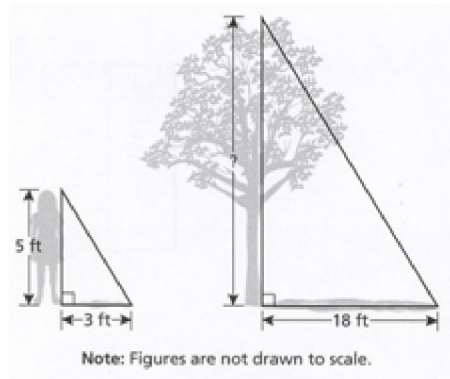KEY: operations, estimation, money, ns
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1 Assessment Q #8 Edited slightly to be bimodal.

Every year, rangers count the number of elk living in a park. The table shows the results.

Elk in the Park

Year	Number of Elk
1994	225
1995	209
1996	249
1997	253
1998	267
1999	237

9. What was the median number of elk for the period shown in the table?
   a. 231
   c. 243
   b. 240
   d. 251

ANS: D
To find the **median** or **range** we must first order the data from least to biggest.
Then, the median is the middle number if there is an odd number of data and the average of the two middle numbers if there is an even number of data.
We order the data: 209, 225, 237, 249, 253, 267.
There is an even number of data (6).

So we find the average of the $\frac{6}{2}$ = 3rd and 4th data.

$$\frac{237 + 249}{2} = \frac{486}{2} = 243.$$

BTW:
To find the **mean**, we do *not* need to order the data.
Mean is the average so we just add the data and divide by the number of data (6).
$$\frac{225 + 209 + 249 + 253 + 267 + 237}{8} = \frac{1440}{6} = 240.$$
(If you don't have a calculator, don't bother to add the 200's . Add: 25 + 9 + 49 + 53 + 67 + 37 = 240.
The answer is: $200 + \frac{240}{6} = 200 + 40 = 240$.)

PTS: 1   DIF: Grade 10   REF: PS 02
KEY: tables, mean, median, data, statistics, ps
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1 Assessment Q #9

10. The number of elk increases after 1999 at a rate of 8 elk per year.

How many elk will there be in 2011?
a. 96   c. 325
b. 245   d. 333

ANS: D
Carefully count the number of increases - that is the point of this question!
2000 is 1 increase, 2001 is 2 increases,....2009 is 10 increases,...
So 2011 is 12 increases.
$237 + 12 \cdot 8 = 237 + 96 = 333$.

PTS: 1   DIF: Grade 10   REF: AS 01
KEY: counting, operations, factors, patterns, as
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #10

11. In 1995, there were 110 female elk and 99 male elk in the park.

What was the ratio of male elk to female elk?
a. 9 to 10   c. 10 to 11
b. 9 to 11   d. 11 to 12

ANS: A
Read the sentences carefully - the order is reversed in the question!
The ratio is 99:110.

Now divide carefully: $\dfrac{99}{110} = \dfrac{11 \cdot 9}{11 \cdot 10} = \dfrac{9}{10}$.

So the ratio is: 9 to 10.

(When solving this, I divided quickly and incorrectly....)

PTS: 1   DIF: Grade 10   REF: NS 02
KEY: ratio, fractions, simplifying, cancellation
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #11

12. A girl 5 feet tall casts a 3-foot shadow. At the same time, a tree casts an 18-foot shadow.

What is the height of the tree?

Note: Figures are not drawn to scale.

a. 20 feet
b. 26 feet

c. 30 feet
d. 54 feet

ANS: C
Let x be the height of the tree.
The two triangles are similar so their height to base ratio is the same, that is:
$$\frac{5}{3} = \frac{x}{18}.$$
Cross multiplying, we have:
$5 \cdot 18 = 3x$
$3x = 5 \cdot 18$
$$x = \frac{5 \cdot 18}{3}$$
$$x = \frac{5 \cdot 6}{1}$$
$x = 30$

The answer is 30 feet.

PTS: 1   DIF: Grade 10   REF: NS 02
KEY: ratios, triangles, similar triangles, cross-multiplication
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #12

13. The actual width (*w*) of a rectangle is 18 centimeters (cm). Use the scale drawing of the rectangle to find the actual length (*l*).
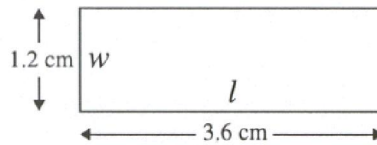
a. 6 cm   c. 36 cm
b. 24 cm   d. 54 cm

ANS: D
The ratio of the distance on paper to the actual distance is the same for both the width and the length because this is a scale drawing. So we have:

$$\frac{1.2}{18} = \frac{3.6}{l}.$$

Cross-multiply and solve for *l*.

$1.2l = 3.6 \cdot 18$

$l = \frac{3.6 \cdot 18}{1.2}$

$l = \frac{3 \cdot 18}{1}$

$l = 54$

The answer is 54 cm.

PTS: 1   DIF: Grade 10   REF: NS 02
TOP: ratios, fractions, simplifying, cross-multiplication, rectangle, measurement, scale, ns, me
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1 Assessment Q #13

14. What is the equation of the line describes a line that fits the data displayed on the graph?
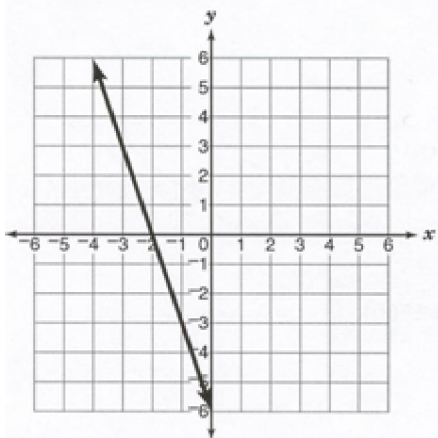
a.   y = -3x – 2   c.   y = 3x – 6
b.   y = -3x – 6   d.   y = -2x - 6

ANS: B

1st way: Process of elimination:
  The y-intercept is -6, so (a) is not the equation.
  The slope is negative (the line slants down from left to right) so (c) is not the answer.
  Substitute the point (-2,0) into (b) and (d):

  (b) $y = -3 \cdot (-2) + 6$

  $y = +6 - 6$

  $y = 0$

  So (-2,0) works in (b).
  Check that it doesn't work in (d):

  (d) $y = -2 \cdot (-2) + 6$

  $y = +4 - 6$

  $y = -2$

  Good, it doesn't work. (BTW: Only one can work since they both have the same y-intercept.)

So (b) is the answer.

2nd way: Using slope-intercept. We observe the points (-2,0) and (0,-6).

$$y - 0 = \frac{-6 - 0}{0 - (-2)} (x - (-2))$$

$$y = \frac{-6}{2} (x + 2)$$

$$y = -3(x + 2)$$

$$y = -3x - 6$$

So (b) is the answer.

PTS: 1   DIF: Grade 10   REF: AS 02
KEY: linear equations, linear functions, slope, intercepts, slope-intercept, coordinates, as
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #14 Edited slightly to be bimodal.

15. When his bus arrives, Calvin is 40 feet east of the corner. The door of the bus is 30 feet north of the corner.

Note: Figure is not drawn to scale.
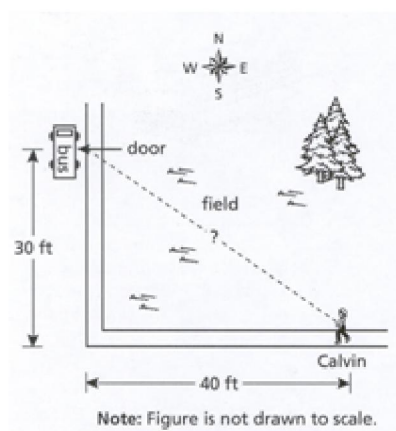
How far will Calvin run directly across the field to the bus?

a. 20 feet
b. 40 feet
c. 50 feet
d. 70 feet

ANS: C
"North" and "east" are perpendicular of each other, so the triangle is a right triangle.

1st way: We use Pythagoras' theorem to find the hypotenuse.

$$d = \sqrt{30^2 + 40^2} = \sqrt{2500} = 50$$

The answer is 50 feet.

or

2nd way: Note that this is a 3-4-5 triangle with scale 10. So the hypotenuse is $5 \cdot 10 = 50$
The answer is 50 feet.

PTS: 1   DIF: Grade 10   REF: ME 03
KEY: right triangles, 3-4-5 triangle, pythagoras, pythagoras' theorem, as, me
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #15

16. The outer perimeter of a picture frame needs to be at least 98 centimeters. The length of the frame must be 8 centimeters longer than the width.

What is the least possible whole number value of the length of the frame?
a.   21 centimeters   c.   29 centimeters
b.   28 centimeters   d.   33 centimeters

ANS: C
From: 'The length of the frame must be 8 centimeters longer than the width.' , we get:
$$l = 8 + w$$
We know: $P = 2l + 2w$ so substituting, we have:
$$P = 2(w + 8) + 2w = 2w + 16 + 2w = 4w + 16$$
$$P = 2w + 16 + 2w$$
$$P = 4w + 16$$

From 'The perimeter must be **at least** 98 centimeters', we get:
$$4w + 16 \geq 98$$
$$4w + 16 - 16 \geq 98 - 16$$
$$4w \geq 82$$
$$\frac{4w}{4} \geq \frac{82}{4}$$
$$w \geq 20. \, something$$
So $w = 21$.
Substituting into our first equation: $l = 8 + 21 = 29$
So $l = 29$ cm.

PTS: 1   DIF: Grade 10   REF: SR 04
KEY: measurement, geometry, perimeter, inequalities, substituting, estimation, me, sr
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #16

17. A scientist tested a new anti-fungal spray for roses. An infected rose bush was sprayed each day and the number of uninfected blossoms was recorded. The scatter plot shows the results.

Anti-Fungal Spray Results
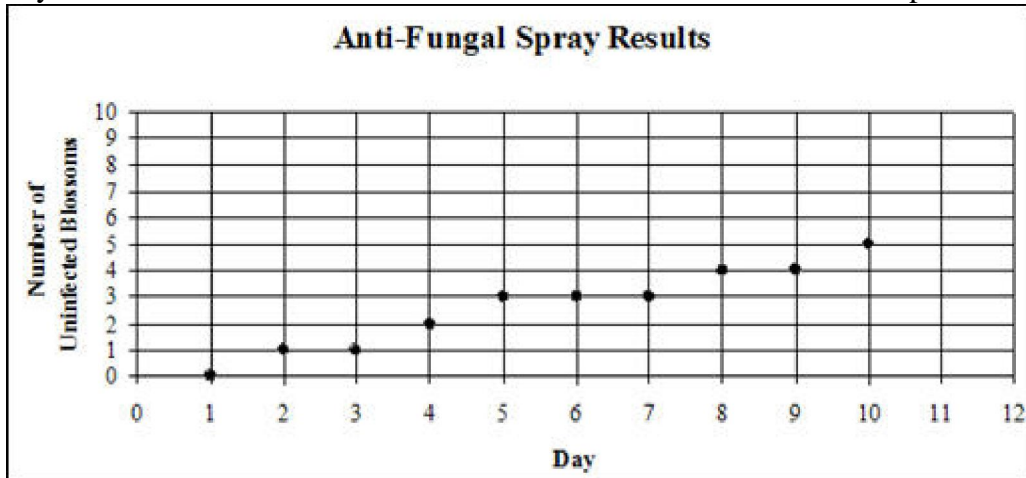
How many uninfected blossoms would the scientist expect to find on day 12?

a. 4   c. 8
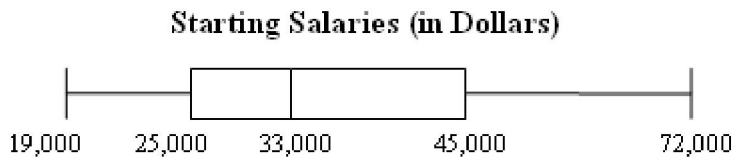b. 6   d. 10

ANS: B

We draw a line approximating the data.

Anti-Fungal Spray Results
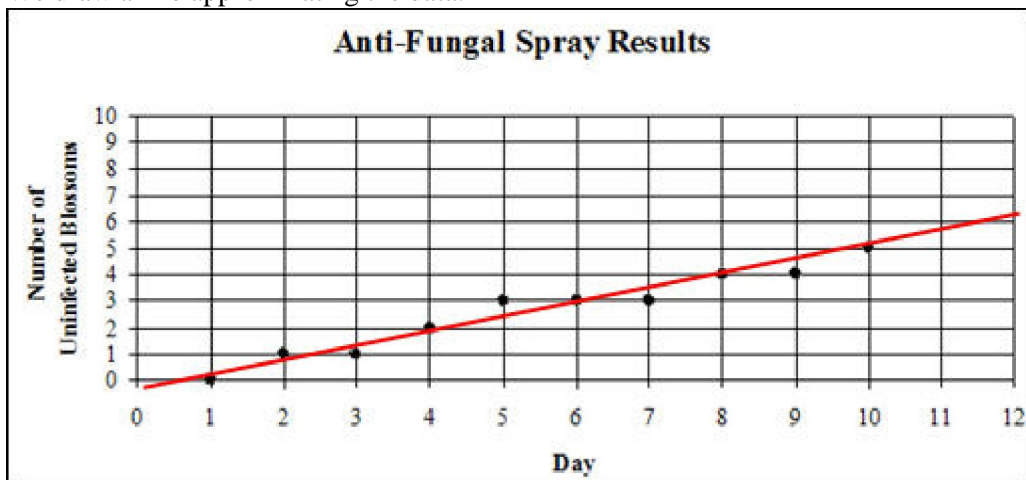
On day 12 (at right) the line is closest to the value 6.

PTS: 1   DIF: Grade 10   REF: PS 03
KEY: scatter plot, approximation, ps, ap
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #17

Starting Salaries (in Dollars)

| 19,000 | 25,000 | 33,000 | 45,000 | 72,000 |

18. The box-and-whisker plot above shows the starting salaries for graduates of a small college.

What is the range of the starting salaries?

a. $20,000
b. $33,000

c. $53,000
d. $72,000

ANS: C
The data ranges from: 19,000 to 72,000 (the ends of the whiskers).
The *range* = 72000 – 19000 = 53000.
The answer is $53,000

PTS: 1   DIF: Grade 10   REF: PS 02
KEY: box-and-whisker plot, plot, range, money, statistics, ps
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #18

19. Using the box and whisker plot above to determine the median salary.

a. $25,000
b. $33,000

c. $38,800
d. $45,000

ANS: B
The median of data displayed in a box-and-whisker plot is marked with a line in the box.
The answer is $33,000.

PTS: 1   DIF: Grade 10   REF: PS 02
KEY: box-and-whisker plot, plot, median, money, statistics, ps
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #19

20. Triangle *RST* is translated so that *R* is mapped to *R* '.
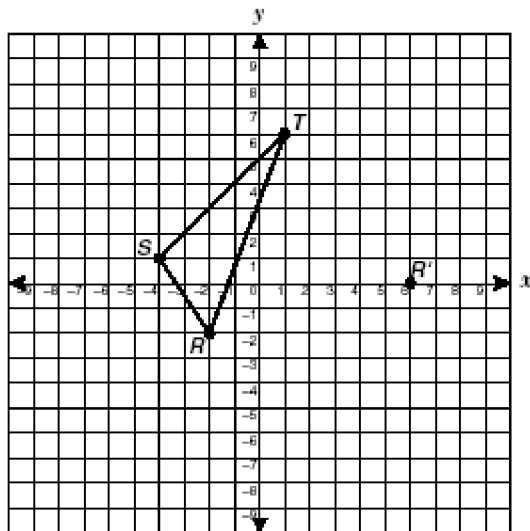
What is the set of ordered pairs best identifies the location of points *S* ' and *T* ' ?

a.   *S* ' (8, 3), *T* ' (3, 8) c.   *S* ' (10, –1), *T* ' (12, –9)
b.   *S* ' (4, 3), *T* ' (9, 8) d.   *S* ' (10, 3), *T* ' (5, 4)

ANS: B
We need to find the translation from R to R'.

Use counting to get (8,2) *or*
  R(-2,-2) and R'(6,0)
  So the translation $(x_T, y_T) = (x_{R'} - x_R, y_{R'} - y_R) = (6 - (-2), 0 - (-2)) = (8, 2)$.

S(-4,1) so $S'(-4 + 8, 1 + 2) = S'(4, 3)$ (and directly choose (b)...)
T((1,6) so $T'(1 + 8, 6 + 2) = T'(9, 8)$

PTS: 1 DIF: Grade 10 REF: GS 02
KEY: tcoordinate graph, coordinates, translation, gs, me
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #20 Edited slightly to be bimodal.

21. An automobile dealer is analyzing a frequency table identifying the number of vehicles of each color sold during the last 6 months.

Which measure of data describes the most popular color of vehicle?
a. Mean   c. Mode
b. Median   d. Range

ANS: C
The **mode** tells us which piece of data occurs with the most frequency. So do the words "most popular". So the answer is "mode".

PTS: 1   DIF: Grade 10   REF: PS 02
KEY: data measures, mean, median, range, mode, frequency table, ps
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #21

22. The drawing shows part of the plan for a new underground lawn-sprinkler system.

Plan for Sprinkler System
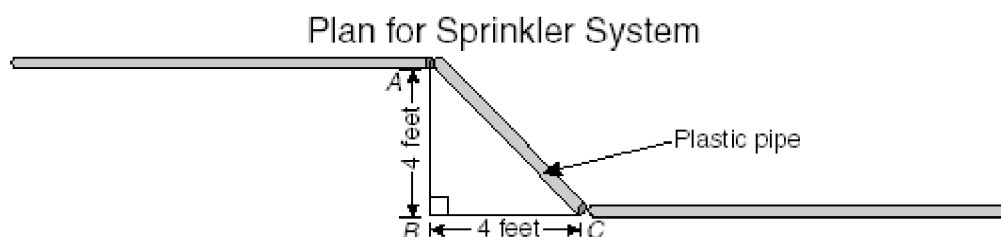
What is the length of the plastic pipe?
a. 4.7 ft   c. 6.7 ft
b. 5.7 ft   d. 7.7 ft

ANS: B
The angle at point B is a right angle. So the triangle ABC is a right triangle.

1st way: We use Pythagoras' theorem to find the hypotenuse.

$$d = \sqrt{4^2 + 4^2} = \sqrt{32} = \sqrt{2 \cdot 16} = 4\sqrt{2} \approx 4 \cdot 1.414 = 5.656$$
The answer is 5,7 feet.

or

2nd way: Note that this is a $1 - 1 - \sqrt{2}$ triangle with scale 4. So the hypotenuse is
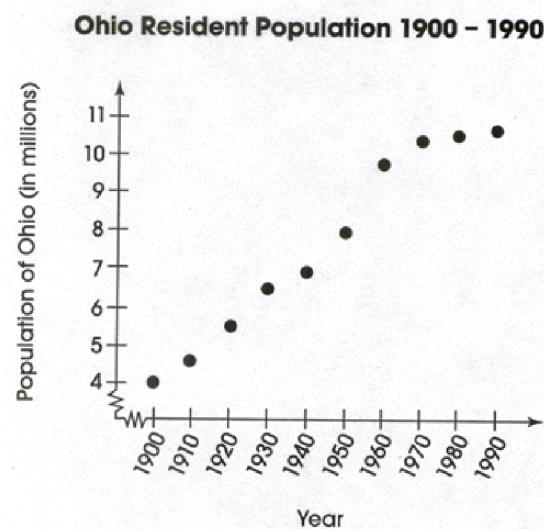$$d = 4\sqrt{2} \approx 4 \cdot 1.414 = 5.656$$
The answer is 5,7 feet.

PTS: 1   DIF: Grade 10   REF: ME 03
KEY: right triangles, basic triangles, pythagoras, pythagoras' theorem, as, me
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #22

23. The graph shows the population of Ohio from 1900 to 1990.

Ohio Resident Population 1900 – 1990
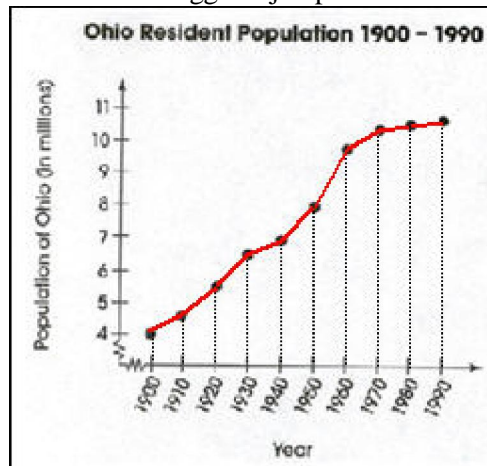
In which decade did the population of Ohio increase the most?
a. 1910 to 1920
b. 1940 to 1950
c. 1950 to 1960
d. 1960 to 1970

ANS: C
First, notice that this is a line graph minus the lines.
We are asked to find the biggest "jump" so we connect the dots to find the steepest line (greatest slope).

Ohio Resident Population 1900 – 1990

The piece with the steepest slope is from 1950 to 1960.

PTS: 1   DIF: Grade 10   REF: ME 02   KEY: line graph, data, slope
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #23

24. In the figure below, the lengths of $\overline{DE}$, $\overline{EF}$, and $\overline{FG}$ are given, in units.

What is the area, in square units, of $\triangle DFG$?
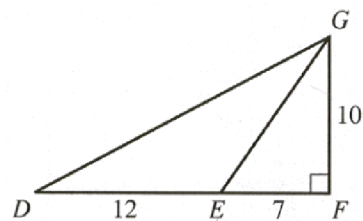
a. 29   c. 60
b. 51   d. 95

ANS: D
Because $\angle DFG = 90°$, the side $\overline{FG} = h$ (height).
So, $A = \dfrac{1}{2} b \cdot h = \dfrac{1}{2}(\overline{DE} + \overline{EF}) \cdot \overline{FG} = \dfrac{1}{2}(12 + 7) \cdot 10 = 19 \cdot 5 = 95$.

Okay - technically, we should write e.g. $\left|\overline{DE}\right|$ to indicate the length, but the above is easier to understand and unmistakable.

PTS: 1   DIF: Grade 10   REF: SR 01
KEY: triangle, right-triangle, length, area, height, units, square units, ge, me, sr
MSC: http://www.k12.wa.us/assessment/WASL/Mathematics/MathematicsModules.aspx -- Week 1
Assessment Q #24

25. The diagram below shows a pasture which is fenced in. All but 1 section of fence run straight north-south or east-west. Consecutive fence posts are 10 feet apart except for the 1 diagonal section. Which of the following statements best describes P, the perimeter of the pasture, in feet?
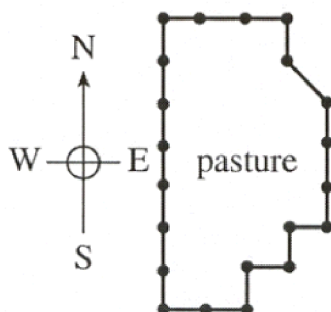
a.　$P > 210$　　　　　　　　　　　c.　$P < 210$

b.　$P = 210$　　　　　　　　　　　d.　$P > 230$

ANS: A
There are 20 pieces or 200 feet of 10 foot fence pieces.
The diagonal piece d of fencing must be longer than 10 feet since it is the hypotenuse of a right-triangle with 10 foot sides.
So $P = 200 + d > 200 + 10 = 210$
$P > 210$

PTS: 1　　　　　　　　DIF: Grade 10　　　REF: NS 05
KEY: counting, perimeter, directions, triangular inequality, hypotenuse, triangles, right triangles, ns
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