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Section A. Each correct answer is worth 1 point.

1. Simplify: $[2 - 0(1 - 5)]$

2. One week ago, Duane was at his house on Main Street in Bluffton, Ohio, working on the contest questions. He thought to himself, "I'd better hurry—next Saturday at this time, students will be taking the test!" How many minutes elapsed between 10:00am (Saturday, October 31, 2015) and 10:00am (Saturday, November 7, 2015)?

3. Consider the numbers $23, 24, 43, 30$ and 25. Let d equal the median and let m equal the mean. Find the value of $d - m$.

4. Solve for all real values of x: $(x - 2)(x - 3) = 6$

5. Factor completely over the rational numbers: $2x^4 - 32$

6. (See figure.) Find the numerical value of the perimeter of the kite shown, given these measurements:

$$AB = x + 3 \qquad BC = x + 4$$
$$CD = 2x - 1 \qquad DA = 3x - y$$
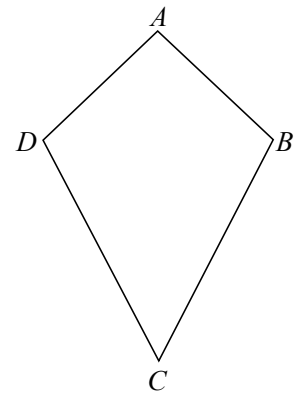
7. Express in simplest radical form: $\sqrt{50} - \sqrt{32}$

Section B. Each correct answer is worth 2 points.

8. The sale ad read, "Buy three baskets at the regular price and get the fourth basket for $14." I paid $200 (before tax) for four baskets at the sale. What was the regular price of one basket?

9. If $\begin{bmatrix} a & b \\ c & d \end{bmatrix} = (20 - 15) \cdot \begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix} - \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, give the values of a, b, c, and d.

10. Solve for x and y: $3^{3x-1} = 9^{y-1}$ and $8^{2x} = \left(\frac{1}{4}\right)^{y+4}$. Express your answer as an ordered pair (x, y).

11. Find the reciprocal of $\frac{1}{2} + \frac{1}{3} + \frac{1}{4}$. Express as the ratio of two integers in simplest form.

12. Define the expression $a \sharp b$ to mean $a^2 + 3b$. There are four pairs of natural numbers (a, b) such that $a \sharp b = 37$. Two such pairs are $(1, 12)$ and $(2, 11)$. Find the other two pairs.

Section C. Each correct answer is worth 3 points.

13. How many liters of a 5% acid solution must be added to 6 liters of a 14% acid solution in order to obtain an 8% acid solution?

14. The scale factor of two spheres is $3 : 4$. The sum of their volumes is 3276π cm^3. Find the radius, in cm, of the larger sphere.

15. Express in simplest radical form: $\det \begin{bmatrix} 1 & \sqrt{3} \\ 2 & 4 \end{bmatrix} + \sum_{k=-1}^{2} \cos(30k°)$

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Section A. Each correct answer is worth 1 point.

1. Simplify: $\frac{2015}{5} - \frac{1520}{4}$

2. Abby, Becka, Carli, and Dani are 15, 16, 17, and 18 years old, but not necessarily in that order. Carli is older than Dani and younger than Abby. Becka is younger than Carli and older than Dani. How old is Carli?

3. $3 + 47$ is one of <u>four</u> ways that 50 can be expressed as the sum of two primes. Find the <u>other three</u>.

4. Penny has \$20.15 in dimes and nickels. The number of dimes is one fewer than the number of nickels. How many nickels does she have?

5. If $20^x = 2015$, find x rounded off to the nearest tenth.

6. Find the least common multiple of 124 and 356.

7. (See figure.) On your answer sheet, circle the capital letter of the triangle which is <u>not</u> similar to the other four.
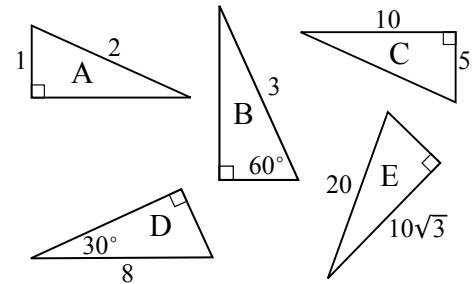
Section B. Each correct answer is worth 2 points.

8. Find the four integer values of x for which $|x^2 - 9|$ is a prime number.

9. Ten marbles numbered 1 to 10 are placed in a jar. Jack reached in and randomly removed one of the marbles and did not replace it. Then Jill reached into the jar and randomly removed another marble. What is the probability that the sum of the two selected marbles is an even number? Express your answer as the ratio of two integers in simplest form.

10. The point $(k, 2)$ lies on a line that is perpendicular to the line $3x + 4y = 24$ at the point $(4, 3)$. Find k.

11. (See figure.) The area of rectangle $RSTU$ is 24. M is the midpoint of $\overline{RU}$, and N is the midpoint of $\overline{RS}$. Find the area of pentagon $MNSTU$.

12. A geometric sequence includes these three consecutive terms: x, $x + 3$, and $3x + 3$. One possible value of x is 3. Find the other possible value of x.
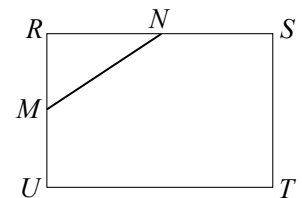
Section C. Each correct answer is worth 3 points.

13. One minus the reciprocal of $(1 - p)$ equals the reciprocal of $(1 - p)$. Find p.

14. Find the value of t so that $\log_{16}(\log_2(\log_2 t)) = \frac{1}{2}$.

15. (See figure.) Given $\triangle ABC$, with $BC = 12$, $DB = 9$, $CD = 6$, and $m\angle DAC = m\angle BCD$. determine the numerical value of the perimeter of $\triangle ACD$.