Clark County School District
K–12 Mathematics

High School Practice Proficiency Examination Spring 2012

1. Which tool would be most appropriate to use to measure the perimeter of a school building?

   A. protractor

   B. ruler

   C. meterstick

   D. tape measure

2. A drama teacher is randomly choosing students for *r* different roles in a play. There are 8 students from which to choose and the number of possible outcomes is 56. How many roles *r* are in the play?

   A. $r = 2$

   B. $r = 3$

   C. $r = 5$

   D. $r = 7$

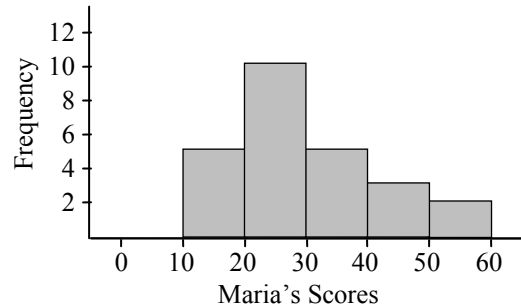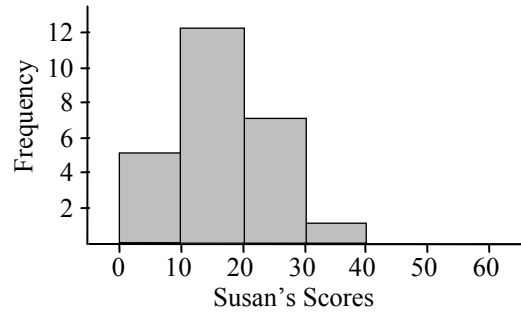3. Simplify.

   $$\frac{2x^2}{4x}, \text{ where } x \neq 0$$

   A. 1

   B. x

   C. $2x$

   D. $\dfrac{x}{2}$

4. Use the figure below.
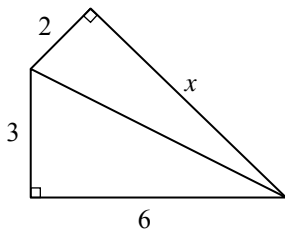
   What is the value of *x*?

   A. $\sqrt{23}$

   B. $\sqrt{31}$

   C. $\sqrt{41}$

   D. $\sqrt{49}$

Questions 5 and 6. The histograms below show the number of points scored by two basketball players: Susan and Maria. Each played in 25 games.

5. Which statement is true when comparing Susan's and Maria's scores?

   A. Susan's mean score is higher and Maria's scores are more variable.

   B. Susan's mean score is higher and Susan's scores are more variable.

   C. Maria's mean score is higher and Maria's scores are more variable.

   D. Maria's mean score is higher and Susan's scores are more variable.

6. Which could be the range of Maria's scores?

   A. 58 points

   B. 48 points
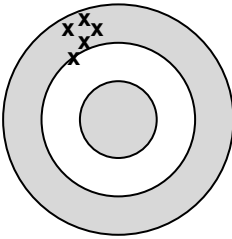
   C. 28 points

   D. 8 points

7. Use the system of equations below.

$$\begin{cases} y = 3x + 1 \\ 2y = px + q \end{cases}$$

For what values of p and q does the system of have an infinite number of solutions?

   A. $p = 3, q = 1$

   B. $p = 3, q = 2$

   C. $p = 6, q = 1$

   D. $p = 6, q = 2$

8. The diagram below shows a dart board of three rings. The goal is to hit the center ring. A dart player threw five darts and the X's represent the points where the darts hit the board.

   Which statement best describes the dart player's accuracy and precision?

   A. accurate—no; precise—yes

   B. accurate—no; precise—no

   C. accurate—yes; precise—yes

   D. accurate—yes; precise—no

9. A student tosses a fair coin 3 times and all 3 results are heads. What is the probability that the next toss will be heads?

   A. 0%

   B. 25%

   C. 50%

   D. 100%

10. Read the statement below.

   Ravens are black.

   Which conditional statement is equivalent to the given statement?

   A. If a bird is a raven, then it is black.

   B. If a bird is black, then it is a raven.

   C. If a bird is not a raven, then it is not black.

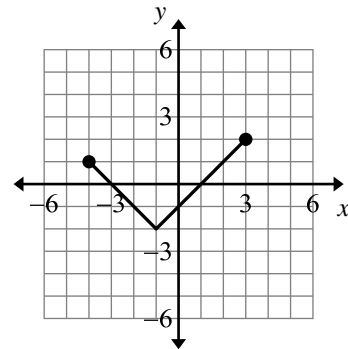   D. If a raven is not black, then it is not a bird.

11. Factor.

   $$3x^2 - 6x + 3$$

   A. $(3x - 1)(x + 3)$

   B. $(3x + 1)(x + 3)$

   C. $3(x - 1)(x + 1)$

   D. $3(x - 1)^2$

12. What is the value of $\dfrac{3^2 \cdot 2^3}{2^2 \cdot 2^1}$?

   A. 9

   B. $\dfrac{9}{2}$

   C. $\dfrac{9}{4}$

   D. $\dfrac{27}{2}$

13. Use the graph of the absolute value function below.

   What is the domain of this function?
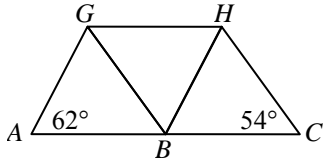
   A. All real numbers

   B. $-4 \le x \le 3$

   C. $y \ge -2$

   D. $x \ge -2$

14. Which expression is closest to 18?

   A. $3^2 + 2^3$

   B. $\sqrt{80} + \sqrt{80}$

   C. $2\sqrt[3]{1000}$

   D. 9^2

15. In the figure below, triangles *ABG*, *BCH*, and *HGB* are congruent.

    What is the measure of angle *GBH*?

    A. 54°

    B. 58°

    C. 62°

    D. 64°

16. The equation below illustrates a property of real numbers.

    17(1) = 1(17) = 17

    What is the property?

    A. associative property of multiplication

    B. distributive property

    C. multiplicative identity property

    D. multiplicative inverse property

17. The table below shows the high temperatures for Paris, France and New York City, USA over the same 4-day period.

	High Temperature	
Day	**Paris**	**New York City**
Thursday	12°C	48°F
Friday	19°C	53°F
Saturday	12°C	53°F
Sunday	13°C	48°F

    Which city had the higher mean temperature?

    A. Paris had the higher mean temperature.

    B. New York City had the higher mean temperature.

    C. Their mean temperatures were the same.

    D. One cannot compare mean temperatures when measured in different systems.

18. The formula for the volume *V* of a rectangular pyramid is shown below, where *h* is the height and *B* is the area of the rectangular base.

$$V = \frac{1}{3}Bh$$

    When the volume of a rectangular pyramid is 18 cubic inches, its height is 9 inches, and the length of the base is 3 inches, what is the width of the base?

    A. 1 inch

    B. 2 inches

    C. 3 inches

    D. 6 inches

19. The first five terms of a sequence are given below.

    1 3 9 27 81

    The sequence continues. Which expression represents the nth term of the sequence?

    A. 3^{n-1}

    B. $3n - 2$

    C. $3n$

    D. 3^n

20. Which point best represents the value of $\sqrt{14}$?
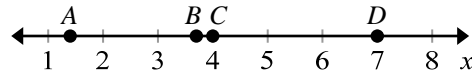
    A. Point *A*

    B. Point *B*

    C. Point *C*

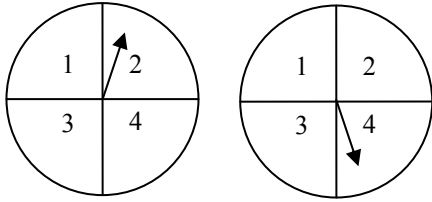   D. Point *D*

21. A sequence is defined as follows:

    The nth term is three more than twice the square of *n*.

    What is the 7th term of the sequence?

    A. 5

    B. 7

    C. 101

    D. 199

22. A game uses the two fair spinners shown below.

Both spinners are spun and the two numbers are added. If a player has that sum, it is crossed off the game card. Only one total may be crossed off per turn. The first player to cross of all numbers wins.

Which game card should be chosen so a player has the best chance of winning?

A.

1	2	3
4	■	5
6	7	8

B.

2	2	3
4	■	6
7	8	8

C.

3	4	5
5	■	5
5	6	7

D.

2	3	4
5	■	5
6	7	8

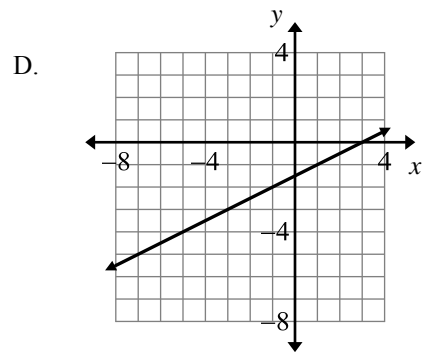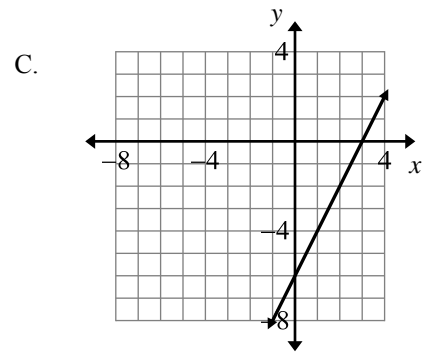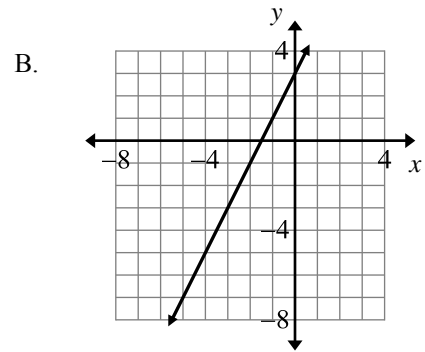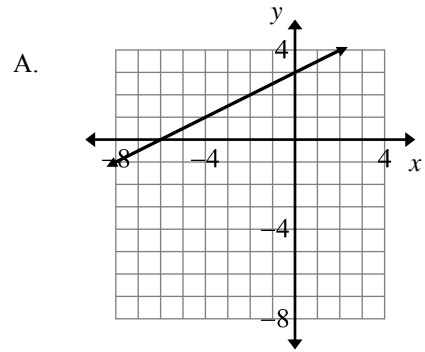23. Which pair of equations represents perpendicular lines?

A. $\begin{cases} y = \dfrac{1}{2}x + 2 \\ y = -\dfrac{1}{2}x + 4 \end{cases}$

B. $\begin{cases} y = 5x + 7 \\ y = -\dfrac{1}{5}x + 3 \end{cases}$

C. $\begin{cases} y = \dfrac{1}{5}x + 2 \\ y = \dfrac{1}{5}x + 1 \end{cases}$

D. $\begin{cases} y = 3x + 4 \\ y = 6x + 8 \end{cases}$

24. Which graph represents $y = 2x + 3$?

A.

B.

C.

D.

25. A group of 3 different desserts is chosen from a menu of 10 desserts. Which expression represents all possible combinations of 3 desserts?

    A. $10!$

    B. $\dfrac{10!}{3!}$

   C. $\dfrac{10!}{(10-3)!}$

    D. $\dfrac{10!}{(10-3)!3!}$

26. Scientists say that temperature in degrees Fahrenheit can be determined by adding 41 to the number of chirps a cricket makes in 13 seconds (if the temperature is above 55°F). If n is the number of chirps counted in 13 seconds, which formula represents the temperature T in degrees <u>Celsius</u>?

    A. $T = \dfrac{5n+45}{9}$

    B. $T = \dfrac{9n+73}{5}$

    C. $T = \dfrac{5n+493}{9}$

    D. $T = \dfrac{9n+529}{5}$

27. Sally says she never has to use subtraction when solving linear equations. Which property of real numbers is Sally using in place of subtraction?

    A. commutative property of addition

    B. associative property of addition

    C. additive identity property

    D. additive inverse property

28. Which graph shows a function with range $y \le 3$?

    A.

    B.

    C.

    D.
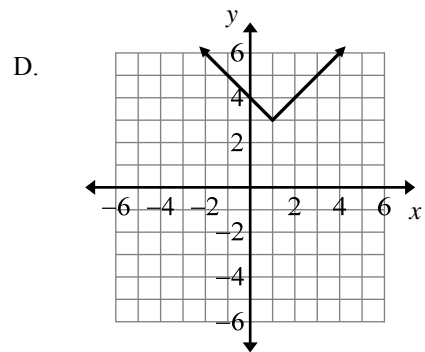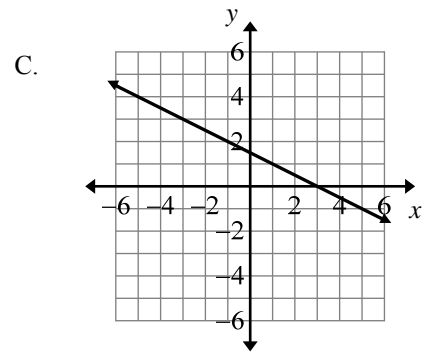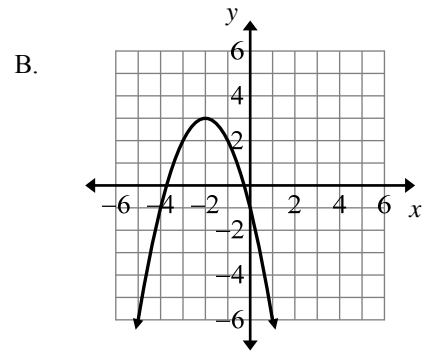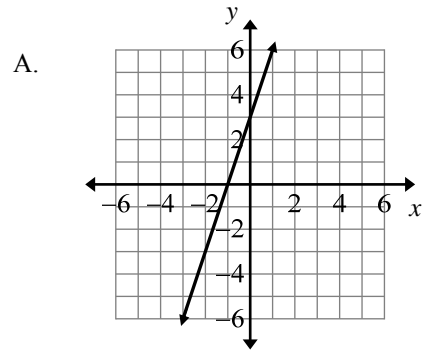
29. A group of 100 people was asked to vote on their favorite mascot for a new basketball team. The table below shows the results.

Favorite Mascot	Number of People
Lions	25
Tigers	35
Bears	15
Orcas	3
Marlins	20
Geese	2

Which graph would be an appropriate display for this information?

A.

B.

C.

D.
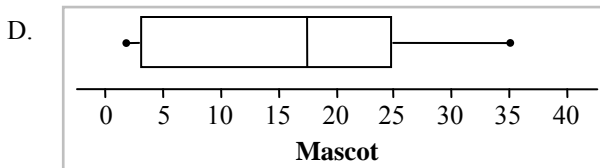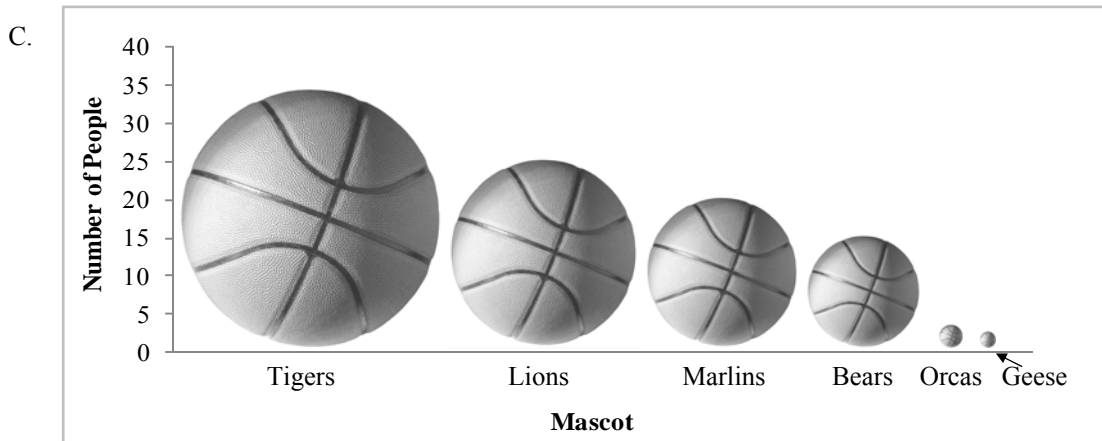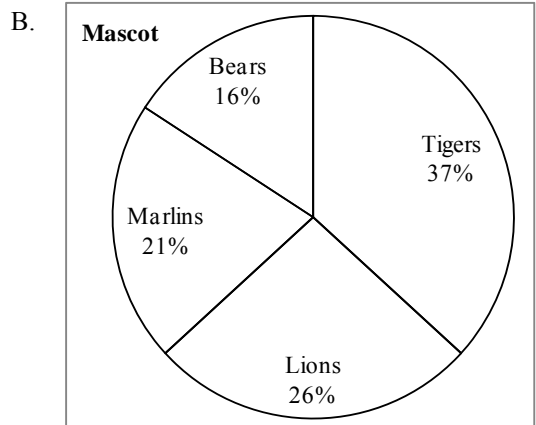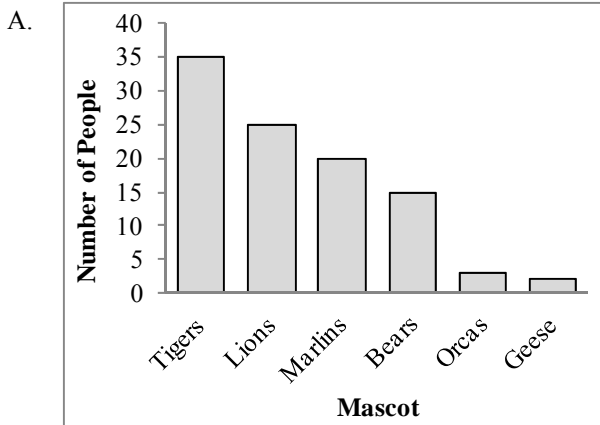
30. Use the set of numbers below.

    5 5 7 8 9 11 12 17 30 40

    Which of the following numbers, when included in the set, would change the mean but not the median or mode?

    A. 0

    B. 5

    C. 10

    D. 15

31. Use the figure below.
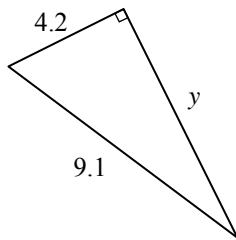
    Which equation shows the value of *y*?

    A. $y = \sqrt{9.1^2 - 4.2^2}$

    B. $y = \sqrt{4.2^2 + 9.1^2}$

    C. $y = 9.1^2 - 4.2^2$

    D. $y = 4.2^2 + 9.1^2$

32. A set of data is written in numerical order. Which term describes the spread of the middle half of the data?

    A. mean

    B. median

    C. interquartile range

    D. range

33. The square root of *k* is between 7 and 8. Which statement about *k* is true?

    A. $0 < k < 5$

    B. $10 < k < 20$

    C. $25 < k < 35$

    D. $45 < k < 65$

34. In the figure below, $\angle DAB \cong \angle BCD$.
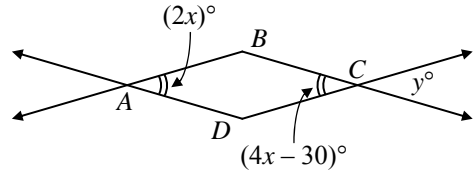
    What is the value of *y*?

    A. $y = 30$

    B. $y = 45$

    C. $y = 60$

    D. $y = 75$

35. Use the inequality below where all variables are positive numbers.

    $$Q \geq -\frac{MP}{R}$$

    Which shows the inequality solved for *M*?

    A. $M \geq -\frac{QP}{R}$

    B. $M \leq -\frac{QP}{R}$

    C. $M \geq -\frac{RQ}{P}$

    D. $M \leq -\frac{RQ}{P}$

36. Use the figure below.
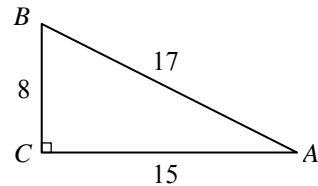
    What is the cosine of angle *A*?

    A. $\frac{8}{15}$

    B. $\frac{8}{17}$

    C. $\frac{15}{17}$

    D. $\frac{17}{8}$

37. The seniors at East High School voted for their favorite category for the yearbook. The results of the vote are represented in the bar graph.

Best Smile   84
Best Grades   50
Best Couple   38
Best Humor   28

Frequency

Which category received more than 20% of the vote but less than 30% of the vote?

A. Best Smile

B. Best Grades

C. Best Couple

D. Best Humor

38. In the figure below, lines m and n are intersected by transversal t.
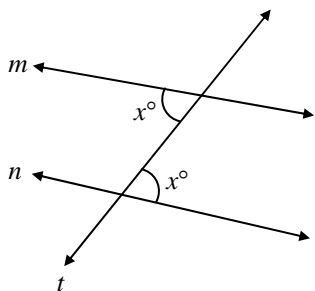
Which statement <u>must</u> be true?

A. $x = 45$

B. $x = 90$

C. lines m and n intersect

D. lines m and n are parallel

39. Use the system of equations below.

$$\begin{cases} x = 4 \\ y = 2 \end{cases}$$

Which statement best describes the solution set of the system?

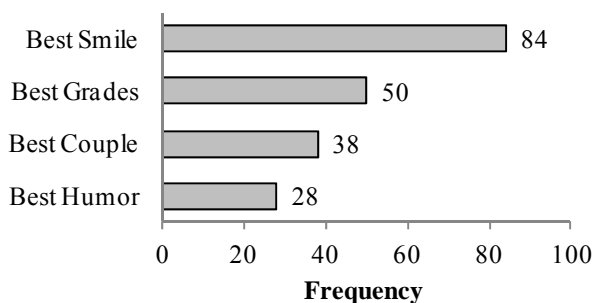A. The solution set is only the ordered pair (4, 2).

B. The solution set is all ordered pairs where $x = 4$; y can be any real number.

C. The solution set is all ordered pairs where $y = 2$; x can be any real number.

D. There is no solution to the system.

40. A bank offers savings certificates as investments. Interest is earned for the actual amount of time the money is in the bank. There are penalties if a certificate is cashed in before the end of its term. The table below shows the interest rates and penalties for certificates of different lengths.

Length of Certificate	Simple Interest Rate	Early Penalty
3–11 months	0.5% per year	Lose all interest
12–23 months	1.0% per year	Lose 2 months interest
24–35 months	2.0% per year	Lose 4 months interest
36–59 months	3.0% per year	Lose 6 months interest
60 months	4.0% per year	Lose 6 months interest

Lucy invested $1,000 in a 36-month certificate, but cashed it in after 30 months. How much interest did Lucy earn?

A. $90

B. $75

C. $60

D. $45

Standards and Key by Question

Question	Key	2006 Standard	DOK
1	D	3.12.3	1
2	A	5.12.4	2
3	D	2.12.3	1
4	C	4.12.7	2
5	C	5.12.1	1
6	B	5.12.1	1
7	D	2.12.5	3
8	A	3.12.2	1
9	C	5.12.5	1
10	A	4.12.9	2
11	D	2.12.3	1
12	A	1.12.7	1
13	B	2.12.4	2
14	B	1.12.6	1
15	D	4.12.2	2
16	C	1.12.8	1
17	A	3.12.3	3
18	B	3.12.5	2
19	A	2.12.1	3
20	B	1.12.6	2
21	C	2.12.1	2
22	C	5.12.5	2
23	B	4.12.5	1
24	B	4.12.5	2
25	D	5.12.4	1
26	A	2.12.2	3
27	D	1.12.8	2
28	B	2.12.4	2
29	A	5.12.3	2
30	C	5.12.2	2
31	A	4.12.7	1
32	C	5.12.2	1
33	D	1.12.7	1
34	A	4.12.6	2
35	C	2.12.2	2
36	C	4.12.2	1
37	B	5.12.1	2
38	D	4.12.6	1
39	A	2.12.5	2
40	C	3.12.4	3

Standards and Key by Content/DOK

Question	Key	2006 Standard	DOK
14	B	1.12.6	1
20	B	1.12.6	2
12	A	1.12.7	1
33	D	1.12.7	1
16	C	1.12.8	1
27	D	1.12.8	2
21	C	2.12.1	2
19	A	2.12.1	3
35	C	2.12.2	2
26	A	2.12.2	3
3	D	2.12.3	1
11	D	2.12.3	1
13	B	2.12.4	2
28	B	2.12.4	2
39	A	2.12.5	2
7	D	2.12.5	3
8	A	3.12.2	1
1	D	3.12.3	1
17	A	3.12.3	3
40	C	3.12.4	3
18	B	3.12.5	2
36	C	4.12.2	1
15	D	4.12.2	2
23	B	4.12.5	1
24	B	4.12.5	2
38	D	4.12.6	1
34	A	4.12.6	2
31	A	4.12.7	1
4	C	4.12.7	2
10	A	4.12.9	2
5	C	5.12.1	1
6	B	5.12.1	1
37	B	5.12.1	2
32	C	5.12.2	1
30	C	5.12.2	2
29	A	5.12.3	2
25	D	5.12.4	1
2	A	5.12.4	2
9	C	5.12.5	1
22	C	5.12.5	2

Depth of Knowledge (DOK) levels are estimated.

Solutions and Hints for:
CCSD Practice Proficiency Exam – Spring 2012

1. Use the tool that is the most appropriate for making long measurements. In this case tape measure.
   ANSWER – D

2. the number of permutations $_nP^r$ that gives 56 possibilities (8)(7) is 2.
   ANSWER – A

3. **ANSWER – D**

4. The hypotenuse of the bottom triangle is $\sqrt{9+36} = \sqrt{45}$; so the hypotenuse of the top triangle is
   $$2^2 + x^2 = \left(\sqrt{45}\right)^2$$
   also $\sqrt{45}$. Using the top triangle, $x^2 = 41$
   $$x = \sqrt{41}$$

   ANSWER – C

5. Maria's scores are higher, so the mean is higher
   ANSWER – C

6. Maximum range 60-10=50; minimum range 50-20=30
   ANSWER – B

7. Since y is doubled in the second equation, the second equation would need to be twice the first so they would lie on the same line.
   p=2(3)=6; q=2(1)=2
   ANSWER – D

8. Close to center (accurate)? – NO; close to each other (precision)? – YES
   ANSWER – A

9. Each toss would have the same theoretical probability, even though the experimental outcome did not match.
   ANSWER – C

10. $p \rightarrow q$
    ANSWER – A

11. Fact out common factor, 3, then factor the trinomial square.
$$3(x^2 - 2x + 1)$$
$$3(x - 1)^2$$

ANSWER – D

12. $$\frac{3^2 \cdot 2^3}{2^3} = 3^2$$

ANSWER – A

13. The x-values can only be from -4 to 3

ANSWER – B
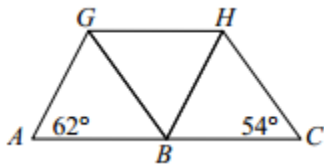
14. A. $9 + 8 = 17$

B. $\sqrt{80} + \sqrt{80}$ is almost just less than $\sqrt{81} + \sqrt{81}$ or less than 9+9 or 18

C. $2 \cdot 10 = 20$

D. $9^2 = 81$

ANSWER – B

15.

Each triangle must have a 62°, 54°, and **64°**

By checking the order of the given congruent triangles, $\angle GBH = 64^\circ$

ANSWER – D

16. Multiplying by one does not change the product.

ANSWER – C

17. Be careful when comparing Celsius and Fahrenheit temperatures.

For example, $10^\circ C = 50^\circ F$

ANSWER – A

18. $V = \frac{1}{3} lwh; \quad 18 = \frac{1}{3}(3w)9; \quad 18 = 9w; \quad w = 2$

ANSWER – B

19. A fairly easy pattern to see:

n	1	2	3	4	5	N
term	1	3	9	27	81	
Pattern		3^1	3^2	3^3	3^4	3^{n-1}

ANSWER – A

20. $\sqrt{14} < \sqrt{16}$; $\sqrt{16} = 4$; therefore $\sqrt{14} < 4$
     ANSWER – B

21. $a_n = 2n^2 + 3$; $a_7 = 2(7)^2 + 3 = 98 + 3 = 101$
     ANSWER – C

22. Hints: consider the possibilities and probabilities. You could never have a sum of 1. Higher probabilities exist for getting sums of 3 to 7.
     ANSWER – C

23. Slopes of perpendicular lines are opposite reciprocals.
     ANSWER – B

24. Slope =2 and y-intercept = 3 (from the equation)
     ANSWER – B

25. Use the formula for combinations $_{10}C_3 = \dfrac{n!}{r!\ n-r\ !} = \dfrac{10!}{3!(10-3)!}$

     ANSWER – D

26. F=n+41 $F = n + 41$ $C = \dfrac{5}{9}(F - 32)$; $C = \dfrac{5}{9}((n+41) - 32)$; $C = \dfrac{5}{9}(n + 9)$

     $C = \dfrac{5n + 45}{9}$

     ANSWER – A

27. Subtraction is often defined as adding the opposite.
     ANSWER – D

28. The entire graph is below y = 3, so $y \le 3$
     ANSWER – B

29. Even though it looks like the basketballs are the same height, they are not the same area.
     ANSWER – A

30. Since the median is 10, you could insert a 10 and not change the median. The mode is 5 so it will not change.
     ANSWER – C

31. By the Pythagorean Theorem, $a^2 + b^2 = c^2$; $y^2 = 9.1^2 - 4.2^2$; $y = \sqrt{9.1^2 - 4.2^2}$

ANSWER – A

32. **ANSWER C**

33. Even though $49 < k < 64$; answer D is the only subset of that solution.

ANSWER – D

34. $2x = 4x - 30$; $2x = 30$; $x = 15$; since $y = 2x$, $y = 30$

ANSWER – A

35. $QR \geq -MP$; $\dfrac{QR}{P} \geq -M$; $-\dfrac{QR}{P} \leq M$; $M \geq -\dfrac{QR}{P}$

ANSWER – C

36. $\cos \angle A = \dfrac{adj}{hyp} = \dfrac{15}{17}$

ANSWER – C

37. 200 votes; 20%=40, 30%=60. The category that fits between those percentages is Best Grades.

ANSWER – B

38. The alternate interior angles are congruent. Lines are parallel if the alternate interior angles are congruent.

ANSWER – D

39. The lines are vertical and horizontal that only intersect in one point.

ANSWER – A

40. A 36 month certificate earns 3% per year. The money was in for 2.5 years, (1000)(.03)(2.5)=75. But there is a 6 month (.5 year) penalty for early withdrawal, so deduct (30)(.5)=15.

ANSWER - C