Algebra II

1 What is the complete solution to the equation $|3-6x|=15$?

A $\quad x=2; x=3$

B $\quad x=-2; x=3$

C $\quad x=2; x=-3$

D $\quad x=-2; x=-3$

CST00507

2 For a wedding, Shereda bought several dozen roses and several dozen carnations. The roses cost \$15 per dozen, and the carnations cost \$8 per dozen. Shereda bought a total of 17 dozen flowers and paid a total of \$192. How many roses did she buy?

A $\quad$ 6 dozen

B $\quad$ 7 dozen

C $\quad$ 8 dozen

D $\quad$ 9 dozen

CST00099

3 What is the solution to the system of equations shown below?

$$\begin{cases} 2x - y + 3z = 8 \\ x - 6y - z = 0 \\ -6x + 3y - 9z = 24 \end{cases}$$

A $\quad (0,4,4)$

B $\quad \left(1,4,\dfrac{10}{3}\right)$

C $\quad$ no solution

D $\quad$ infinitely many solutions

CST00203

4 A restaurant manager bought 20 packages of bagels. Some packages contained 6 bagels each, and the rest contained 12 bagels each. There were 168 bagels in all. How many packages of 12 bagels did the manager buy?
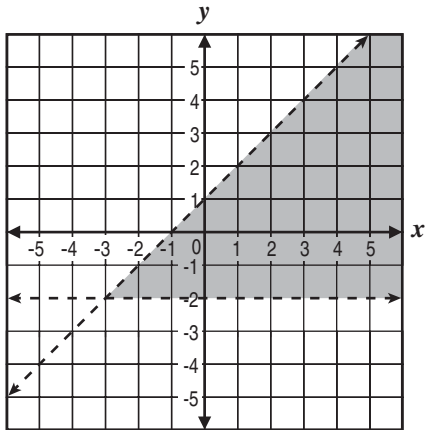
A $\quad$ 6

B $\quad$ 8

C $\quad$ 9

D $\quad$ 12

CST00491

5 What system of inequalities *best* represents the graph shown below?

- **A** $y > -2$ and $y > x + 1$
- **B** $y > -2$ and $y < x + 1$
- **C** $y < -2$ and $y > x + 1$
- **D** $y < -2$ and $y < x + 1$

CST00500

6 $2x + 7 \overline{)2x^4 + 21x^3 + 35x^2 - 37x + 46}$

- **A** $x^3 + 7x^2 - 7x + 6 - \dfrac{4}{2x + 7}$
- **B** $2x^3 + 14x^2 - 14x + 12 - \dfrac{4}{2x + 7}$
- **C** $x^3 - 7x^2 + 7x - 6 + \dfrac{4}{2x + 7}$
- **D** $x^3 + 7x^2 - 7x + 6 + \dfrac{4}{2x + 7}$

CST00109

7 Which polynomial represents $(3x^2 + x - 4)(2x - 5)$?

- **A** $6x^3 - 13x^2 - 13x + 20$
- **B** $6x^3 - 13x^2 - 13x + 20$
- **C** $6x^3 + 13x^2 + 3x - 20$
- **D** $6x^3 + 13x^2 + 3x + 20$

CST10024

8 $(-2x^2 + 6x + 1) - 2(4x^2 - 3x + 1) =$

- **A** $6x^2 - 1$
- **B** $-10x^2 - 1$
- **C** $6x^2 + 12x - 1$
- **D** $-10x^2 + 12x - 1$

CST00233

9 Which expression is equivalent to $(6y^2 - 2)(6y + 2)$?

- **A** $36y^2 - 4$
- **B** $36y^3 - 4$
- **C** $36y^2 + 12y^2 + 12y - 4$
- **D** $36y^3 + 12y^2 - 12y - 4$

CST20008

10 $8a^3 + c^3 =$

- **A** $(2a + c)(2a + c)(2a + c)$
- **B** $(2a - c)(4a^2 + 2ac + c^2)$
- **C** $(2a - c)(4a^2 + 4ac + c^2)$
- **D** $(2a + c)(4a^2 - 2ac + c^2)$

CST00118

— **7** —

11 The total area of a rectangle is $4x^4 - 9y^2$. Which factors could represent the length times width?

A $(2x^2 - 3y)(2x^2 + 3y)$

B $(2x^2 + 3y)(2x^2 + 3y)$

C $(2x - 3y)(2x - 3y)$

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

CST10028

12 Which product of factors is equivalent to $(x+1)^2 - y^2$?

A $(x+1+y)^2$

B $(x+1-y)^2$

C $(x-1+y)(x-1-y)$

D $(x+1+y)(x+1-y)$

CST10030

13
$$\frac{x+3}{x+5} + \frac{6}{x^2+3x-10} =$$

A $\dfrac{x^2+x}{x^2+3x-10}$

B $\dfrac{7x-9}{x^2+3x-10}$

C $\dfrac{x^2+x+12}{x^2+3x-10}$

D $\dfrac{x^2+x+1}{x^2+3x-10}$

CST00295

14 Which is a simplified form of $\dfrac{3a^2 b^3 c^{-2}}{(a^{-1}b^2 c)^3}$?

A $\dfrac{3a^5}{b^3 c^5}$

B $\dfrac{3ab}{c^5}$

C $\dfrac{3}{b^2 c^5}$

D $\dfrac{3}{ab^3 c^5}$

CST00267

15 What is $\dfrac{20x^{-4}}{27y^2} \div \dfrac{8x^{-3}}{15y^{-5}}$?

A $\dfrac{32y^3}{81x^\square}$

B $\dfrac{32}{81xy^7}$

C $\dfrac{25y^3}{18x^\square}$

D $\dfrac{25}{18xy^7}$

CST20321

16 Which product is equivalent to $\dfrac{4x^2 - 16}{2-x}$?

A $4(x-2)$

B $4(x+2)$

C $-4(x-2)$

D $-4(x+2)$

CST10041

— **8** —

17
$$\frac{x^2 + 4x}{x+3} \cdot \frac{x^2 - 9}{x^2 + x - 12} =$$

A   1

B x

C $x + 4$

D $\dfrac{x+3}{x-3}$

CST10043

18 What is the simplest form of
$$\frac{5x^3 y + 20x^2 y^2 + 20xy^3}{5xy}?$$

A $(x+2)^2$

B $(x+2y)^2$

C $x^2 + y^2$

D $x^2 + 4y^2$

CST10049

19 If $i = \sqrt{-1}$, which point shows the location of $5 - 2i$ on the plane?
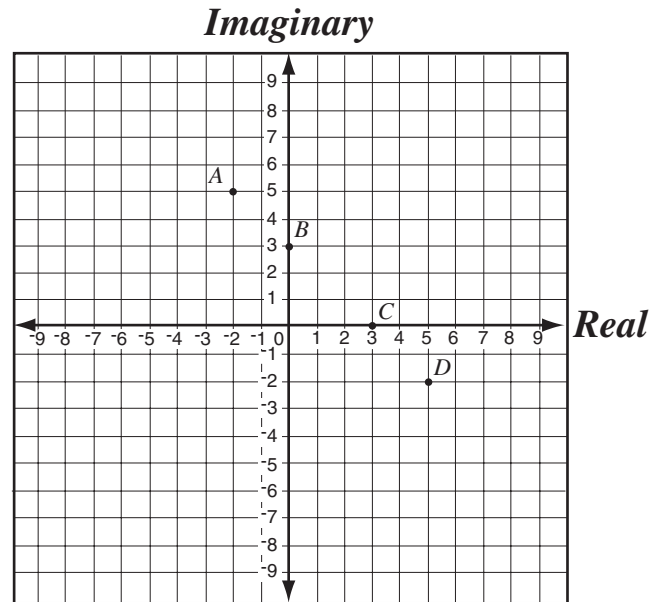
A   point *A*

B   point *B*

C   point *C*

D   point *D*

CST00510

20 If $i = \sqrt{-1}$, what is the value of i^4 ?

A i

B $-i$

C 1

D -1

CST00238

Algebra II

21 If $i = \sqrt{-1}$, then $4i(6i) =$

A 48

B 24

C −24

D −48

CST00512

22 What is an equivalent form of $\dfrac{2}{3+i}$?

A $\dfrac{3-i}{4}$

B $\dfrac{3-i}{5}$

C $\dfrac{4-i}{4}$

D $\dfrac{4-i}{5}$

CST10040

23 What is the product of the complex numbers $(3+i)$ and $(3-i)$?

A 8

B 10

C $9-i$

D $10-6i$

CST10038

24 What are the solutions to the equation $x^2 + 2x + 2 = 0$?

A $x = 0; x = -2$

B $x = 0; x = -2i$

C $x = -1+i; x = -1-i$

D $x = -1+2\sqrt{2}; x = -1-2\sqrt{2}$

CST00114

25 What are the solutions to the equation $1 + \dfrac{1}{x^2} = \dfrac{3}{x}$?

A $x = \dfrac{3}{2} + \dfrac{\sqrt{5}}{2}; x = \dfrac{3}{2} - \dfrac{\sqrt{5}}{2}$

B $x = 3 + \dfrac{\sqrt{5}}{2}; x = 3 - \dfrac{\sqrt{5}}{2}$

C $x = \dfrac{3}{2} + \dfrac{\sqrt{13}}{2}; x = \dfrac{3}{2} - \dfrac{\sqrt{13}}{2}$

D $x = 3 + \dfrac{\sqrt{13}}{2}; x = 3 - \dfrac{\sqrt{13}}{2}$

CST00197

26 There are two numbers with the following properties.

  1) The second number is 3 more than the first number.

  2) The product of the two numbers is 9 more than their sum.

Which of the following represents possible values of these two numbers?

A $-6, -3$

B $-4, -1$

C $-1, 4$

D $-3, 6$

CST20109

27 Jenny is solving the equation $x^2 - 8x = 9$ by completing the square. What number should be added to both sides of the equation to complete the square?

A 2

B 4

C 8

D 16

CST00508

28 Which of the following *most* accurately describes the translation of the graph $y = (x + 3)^2 - 2$ to the graph of $y = (x - 2)^2 + 2$?

A up 4 and 5 to the right

B down 2 and 2 to the right

C down 2 and 3 to the left

D up 4 and 2 to the left

CST10074

29 Which of the following sentences is true about the graphs of $y = 3(x - 5)^2 + 1$ and $y = 3(x + 5)^2 + 1$?

A Their vertices are maximums.

B The graphs have the same shape with different vertices.

C The graphs have different shapes with different vertices.

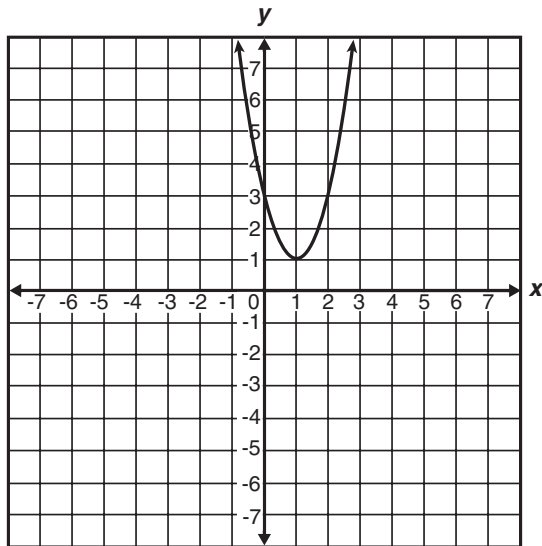D One graph has a vertex that is a maximum, while the other graph has a vertex that is a minimum.

CST10294

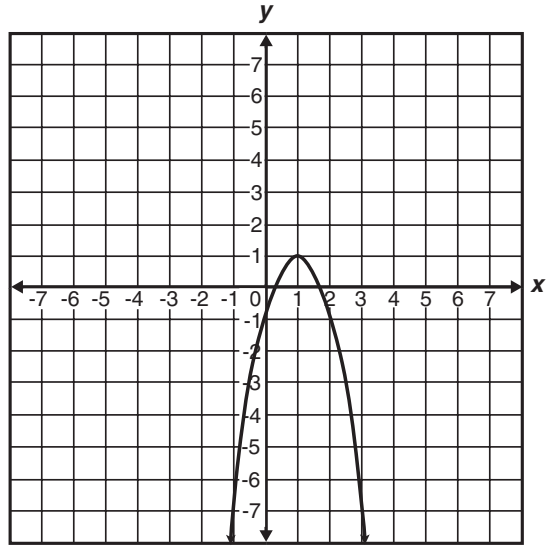**30** What are the *x*-intercepts of the graph of $y = 12x^2 - 5x - 2$?

A 1 and $-\dfrac{1}{6}$

B -1 and $\dfrac{1}{6}$

C $\dfrac{2}{3}$ and $-\dfrac{1}{4}$
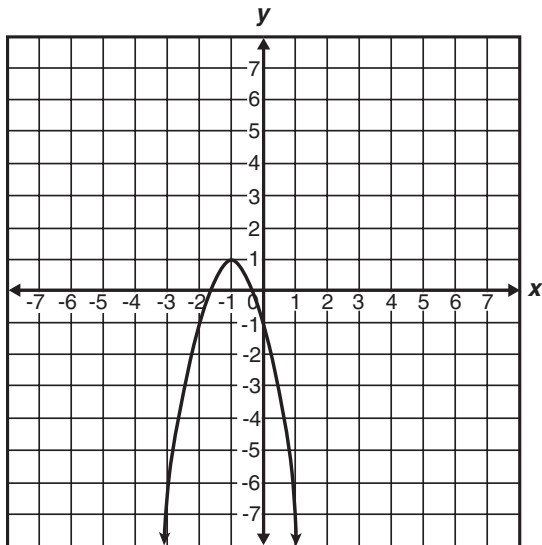
D $-\dfrac{2}{3}$ and $\dfrac{1}{4}$

CST00297

— **11** —

Algebra II

31 **Which is the graph of** $y = -2(x-1)^2 + 1$**?**

A

C

B

D
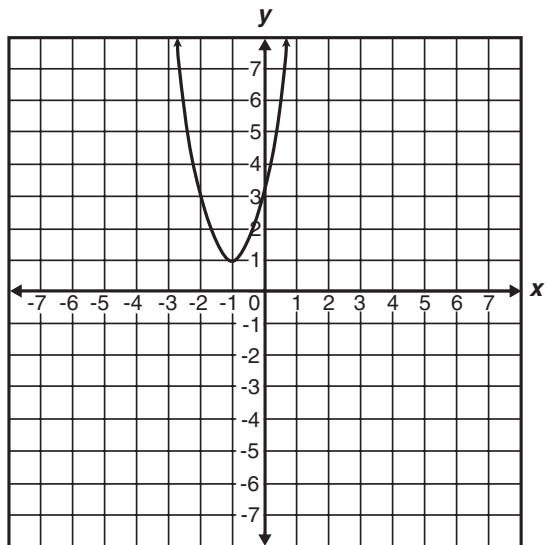
CST10292

32 Which ordered pair is the vertex of $f(x) = x^2 + 6x + 5$?

A $(-3, -4)$

B $(-2, -3)$

C $(-1, 0)$

D $(0, -5)$

CST10084

33 The graph of $\left(\dfrac{x}{2}\right)^2 - \left(\dfrac{y}{3}\right)^2 = 1$ is a hyperbola.

Which set of equations represents the asymptotes of the hyperbola's graph?

A $y = \dfrac{3}{2}x,\ y = -\dfrac{3}{2}x$

B $y = \dfrac{2}{3}x,\ y = -\dfrac{2}{3}x$

C $y = \dfrac{1}{2}x,\ y = -\dfrac{1}{2}x$

D $y = \dfrac{1}{3}x,\ y = -\dfrac{1}{3}x$

CST10304

34 $4x^2 - 5y^2 - 16x - 30y - 9 = 0$

What is the standard form of the equation of the conic given above?

A $\dfrac{(x-4)^2}{11} - \dfrac{(y-3)^2}{4} = 1$

B $\dfrac{(y+3)^2}{4} - \dfrac{(x-2)^2}{5} = 1$

C $\dfrac{(y-3)^2}{6} - \dfrac{(x+2)^2}{9} = 1$

D $\dfrac{(x-4)^2}{11} + \dfrac{(y-3)^2}{4} = 1$

CST00146

35 What is the solution to the equation $5^x = 17$?

A $x = 2$

B $x = \log_{10} 2$

C $x = \log_{10} 17 + \log_{10} 5$

D $x = \dfrac{\log_{10} 17}{\log_{10} 5}$

CST00132

— **13** —

36 If $\log_{10} x = -2$, what is the value of x?

A $x = -\sqrt{\dfrac{1}{10}}$

B $x = \sqrt{\dfrac{1}{10}}$

C $x = \dfrac{1}{100}$

D $x = 100$

CST10255

37 Which equation is equivalent to $\log_3 \dfrac{1}{9} = x$?

A $\dfrac{1^3}{9} = x^3$

B $\left(\dfrac{1}{9}\right)^3 = x$

C $3^x = \dfrac{1}{9}$

D $3^{\frac{1}{9}} = x$

CST10151

38 Which is the first *incorrect* step in simplifying $\log_4 \dfrac{4}{64}$?

Step 1: $\log_4 \dfrac{4}{64} = \log_4 4 - \log_4 64$

Step 2: $= 1 - 16$

Step 3: $= -15$

A Step 1

B Step 2

C Step 3

D Each step is correct.

CST00517

39 Jeremy, Michael, Shanan, and Brenda each worked the same math problem at the chalkboard. Each student's work is shown below. Their teacher said that while two of them had the correct answer, only one of them had arrived at the correct conclusion using correct steps.

Jeremy's work
$$x^3 x^{-7} = \dfrac{x^3}{x^{-7}}$$
$$= x^{10}, x \neq 0$$

Shanan's work
$$x^3 x^{-7} = \dfrac{x^3}{x^7}$$
$$= \dfrac{1}{x^4}, x \neq 0$$

Michael's work
$$x^3 x^{-7} = \dfrac{x^3}{x^{-7}}$$
$$= x^{-4}, x \neq 0$$

Brenda's work
$$x^3 x^{-7} = \dfrac{x^3}{x^7}$$
$$= x^4, x \neq 0$$

Which is a completely correct solution?

A Jeremy's work

B Michael's work

C Shanan's work

D Brenda's work

CST10301

— 14 —

40 A certain radioactive element decays over time according to the equation $y = A\left(\frac{1}{2}\right)^{\frac{t}{300}}$, where A = the number of grams present initially and t = time in years. If 1000 grams were present initially, how many grams will remain after 900 years?

A 500 grams

B 250 grams

C 125 grams

D 62.5 grams

CST00367

41 Bacteria in a culture are growing exponentially with time, as shown in the table below.

Bacteria Growth

Day	Bacteria
0	100
1	200
2	400

Which of the following equations expresses the number of bacteria, y, present at any time, t?

A $y = 100 + 2^t$

B $y = (100) \cdot (2)^t$

C $y = 2^t$

D $y = (200) \cdot (2)^t$

CST10253

42 If the equation $y = 2^x$ is graphed, which of the following values of x would produce a point closest to the x-axis?

A $\frac{1}{4}$

B $\frac{3}{4}$

C $\frac{5}{3}$

D $\frac{8}{3}$

CST20145

43 $\log_6 40 =$

A $\log_{10} 6 + \log_{10} 40$

B $\log_{10} 6 - \log_{10} 40$

C $(\log_{10} 6)(\log_{10} 40)$

D $\dfrac{\log_{10} 40}{\log_{10} 6}$

CST00199

44 What is the value of $\log_3 27$?

A 2

B 3

C 6

D 9

CST00519

45 If $\log 2 \approx 0.301$ and $\log 3 \approx 0.477,$ what is the approximate value of $\log 72$?

A   0.051

B   0.778

C   0.861

D   1.857

CST10362

46 If x is a real number, for what values of x is the equation $\dfrac{3x - 9}{3} = x - 3$ true?

A   all values of x

B   some values of x

C   no values of x

D   impossible to determine

CST00032

47 On a recent test, Jeremy wrote the equation $\dfrac{x^2 - 16}{x - 4} = x + 4.$ Which of the following statements is correct about the equation he wrote?

A   The equation is always true.

B   The equation is always true, except when $x = 4$.

C   The equation is never true.

D   The equation is sometimes true when $x = 4$.

CST10260

48 Given the equation $y = x^n$ where $x > 0$ and $n < 0,$ which statement is valid for real values of y?

A $y > 0$

B $y = 0$

C $y < 0$

D $y \leq 0$

CST20140

49 If x is a real number, which *best* describes the values of x for which the inequality $\sqrt{x} > 0$ is true?

A   all $x > 0$

B   all $x \geq 0$

C   all values of x

D   no values of x

CST00396

50 Abelardo wants to create several different 7-character screen names. He wants to use arrangements of the first 3 letters of his first name (abe), *followed by* arrangements of 4 digits in 1984, the year of his birth. How many different screen names can he create in this way?

A   72

B   144

C   288

D   576

CST10401

51 A train is made up of a locomotive, 7 different cars, and a caboose. If the locomotive must be first, and the caboose must be last, how many different ways can the train be ordered?

A   5040

B   181,440

C   362,880

D   823,543

CST10391

52 Teresa and Julia are among 10 students who have applied for a trip to Washington, D.C. Two students from the group will be selected at random for the trip. What is the probability that Teresa and Julia will be the 2 students selected?

A $\dfrac{1}{45}$

B $\dfrac{2}{45}$

C $\dfrac{1}{5}$

D $\dfrac{2}{5}$

CST00071

53 $(3y-1)^4 =$

A $81y^4 - 108y^3 + 54y^2 - 12y + 1$

B $81y^4 + 108y^3 - 54y^2 - 12y + 1$

C $81y^4 - 54y^3 - 108y^2 - 12y + 1$

D $81y^4 + 54y^3 - 108y^2 - 12y + 1$

CST00308

54 How many terms does the binomial expansion of $\left(x^2 + 2y^3\right)^{20}$ contain?

A   20

B   21

C   40

D   60

CST10316

55 What is the sum of the infinite geometric series

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots ?$$

A   1

B   1.5

C   2

D   2.5

CST20167

56 What is the *n*th term in the arithmetic series below?

$$3 + 7 + 11 + 15 + 19 \dots$$

A $4n$

B $3 + 4n$

C $2n + 1$

D $4n - 1$

CST10178

57 Which expression represents $f(g(x))$ if $f(x) = x^2 - 1$ and $g(x) = x + 3$?

A $x^3 + 3x^2 - x - 3$

B $x^2 + 6x + 8$

C $x^2 + x + 2$

D $x^2 + 8$

CST20032

58 If $f(x) = x^2 + 2x + 1$ and $g(x) = 3(x+1)^2$, which is an equivalent form of $f(x) + g(x)$?

A $x^2 + 4x + 2$

B $4x^2 + 2x + 4$

C $4x^2 + 8x + 4$

D $10x^2 + 20x + 10$

CST10204

59 A math teacher is randomly distributing 15 rulers with centimeter labels and 10 rulers without centimeter labels. What is the probability that the first ruler she hands out will have centimeter labels and the second ruler will *not* have labels?

A $\dfrac{1}{24}$

B $\dfrac{1}{4}$

C $\dfrac{2}{5}$

D $\dfrac{23}{25}$

CST10435

60 On a certain day the chance of rain is **80%** in San Francisco and **30%** in Sydney. Assume that the chance of rain in the two cities is independent. What is the probability that it will *not* rain in either city?

A 7%

B 14%

C 24%

D 50%

CST20180

61 A box contains 7 large red marbles, 5 large yellow marbles, 3 small red marbles, and 5 small yellow marbles. If a marble is drawn at random, what is the probability that it is yellow, given that it is one of the large marbles?
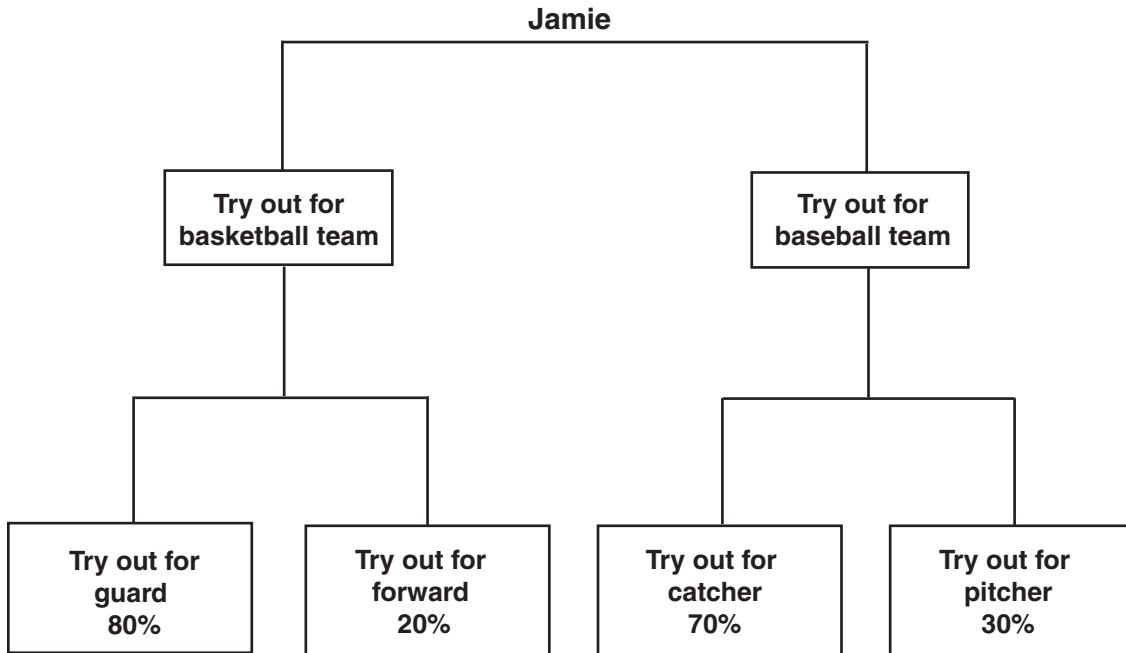
A $\dfrac{5}{12}$

B $\dfrac{7}{20}$

C $\dfrac{5}{8}$

D $\dfrac{1}{5}$

CSN00211

62 The probabilities that Jamie will try out for various sports and team positions are shown in the chart below.

Jamie

Try out for basketball team	Try out for baseball team

Try out for guard 80%	Try out for forward 20%	Try out for catcher 70%	Try out for pitcher 30%

Jamie will definitely try out for either basketball or baseball, but not both. The probability that Jamie will try out for baseball and try out for catcher is 42%. What is the probability that Jamie will try out for basketball?

A 40%

B 60%

C 80%

D 90%

CST10210

63 A small-business owner must hire seasonal workers as the need arises. The following list shows the number of employees hired monthly for a 5-month period.

4, 13, 5, 6, 9

If the mean of these data is approximately 7, what is the population standard deviation for these data? (Round the answer to the nearest tenth.)

A   3.3

B   7.4

C   10.8

D   13.5

CST20052

64 **3, 6, 2, 1, 7, 5**

James found the mean and standard deviation of the set of numbers given above. If he adds 5 to each number, which of the following will result?

A   The mean will be multiplied by 5.

B   The standard deviation will increase by 5.

C   The mean will not change.

D   The standard deviation will not change.

CSN00127