# SAT Math Practice Exam

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Source: McGraw-Hill Professional

This practice exam contains 50 questions that review the 50 Skills that can be found at SAT Math Prep.Take the test. Then check your answers and review the skills for any questions that were difficult.

1. If $8^{x-1} = 2^{x-7}$, what is the value of x?
   - A. 1
   - B. 2
   - C. 3
   - D. 4
   - E. 5

2. If $2m = 5n$ and $5n = 6p$, what is m in terms of p ?
   - A. $5p$
   - B. $3p$
   - C. $2.9p$
   - D. $2.4p$
   - E. p

3. On 10 tests, a student calculated her test average to be 82. However, she discovered that 2 of the grades were recorded incorrectly. The number 85 was entered as 80, and the number 99 was entered as 90. To the nearest whole number, what is the correct average for her 10 grades?
   - A. 81
   - B. 82
   - C. 83
   - D. 84
   - E. 85
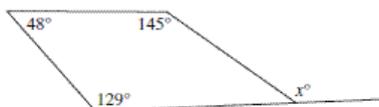
4. In the figure above, what is the value of x ?
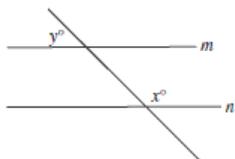

Note: Figure not drawn to scale.

5. In the figure above, $m \parallel n$. If $x = 53$, what is the value of y?
   - A. 27
   - B. 53
   - C. 90
   - D. 127
   - E. 180
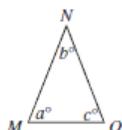
Note: Figure not drawn to scale.

6. If *MN* = *ON* in the figure above, and *b* = 160, what is the value of *c*?
   A. 5
   B. 10
   C. 20
   D. 30
   E. 80
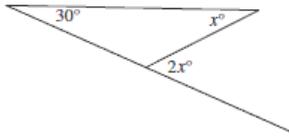
7. In the figure above, what is the value of *x*?
8. If 3 consecutive even numbers have a sum of 42, what is the smallest number?
9. If 12 < *x* < 36, and 36 is the lowest number that is a multiple of 4, 12, and *x*, what is the value for *x*?
10. In an *xy* coordinate plane, two lines may intersect at how many ordered pairs (*x*, *y*) ?
    I. 0
    II. 1
    III. 2
    A. I only
    B. III only
    C. I and II
    D. II and III
    E. I, II, and III
11. What is the slope of the line through the points (2, 3) and (–1, 0) ?
   A. –1
    B. 0
    C. 1
    D. 3
    E. Undefined
12. If the line through the points (–1, 3) and (–2, *p*) is parallel to the line *y* = 3*x* – 3, what is the value of *p* ?
    A. –2
    B. –1
    C. 0
    D. 1
    E. 2

Spice Girl	Votes
Scary	♥ ♥ ♥ ♥ ♥
Baby	♥ ♥
Ginger	♥ ♥
Posh	♥ ♥ ♥
Sporty	♥ ♥ ♥ ♥

♥ = 20 votes

13. The table above shows the results of a survey in which 310 high school students voted for their favorite Spice Girl. Each student received one vote. According to the graph, how many more students favored Scary Spice than Posh Spice?
    A. 1.5
    B. 15
    C. 20
    D. 25
    E. 30
14. If $f(x) = -3x^2 - 2$, what is the value of $f(-1)$?
    A. –6
    B. –5
    C. 1
    D. 5
    E. 6

| x	f(x)
0	2
1	3
2	6
3	11

15. The table above shows the values of the quadratic function f for selected values of x. Which of the following defines f?

   A. $f(x) = x^2 + 1$
   B. $f(x) = x^2 + 2$
   C. $f(x) = 3x^2 - 2$
   D. $f(x) = 3x^2 - 1$
   E. $f(x) = 3x^2 + 1$

16. If t is a negative number, which of the following must be a positive number?

   A. $t + 1$
   B. $t + 2$
   C. $3 - t$
   D. $\frac{t}{3}$
   E. $3t$
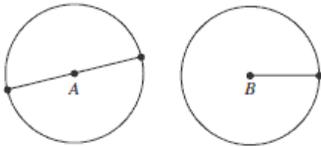
Note: Figure not drawn to scale.

17. For the circles above, the diameter of circle A is 16 and the radius of circle B is half the diameter of circle A. What is the area of circle B?

   A. 8
   B. 16π
   C. 24π
   D. 64π
   E. 160π
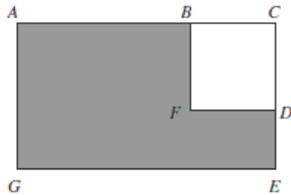
18. In the figure above, the perimeter of square $BCDF$ is 24, $DE = 4$, and $AB = 12$. What is the perimeter of the shaded region?

   A. 28
   B. 43
   C. 56
   D. 68
   E. 82

19. The ratio 1.4 to 2 is equal to which of the following?

   A. 1 to 4
   B. 14 to 2
   C. 10 to 7
   D. 7 to 10
   E. 7 to 100

20. A scale model of a certain airplane is $\frac{3}{35}$ the height of the actual airplane. If the scale is 3.5 inches tall, what is the height of the actual plane?

   A. $38\frac{4}{5}$
   B. 40
   C. $40\frac{5}{6}$
   D. 42
   E. $57\frac{5}{8}$

21. The rectangular solid above has edges of length 20, 8, and 4. If point M (not shown) is the midpoint of segment AB, what is the length of MD?

 A. $4\sqrt{2}$

 B. $3\sqrt{10}$

 C. $6\sqrt{5}$

 D. $2\sqrt{65}$

 E. $8\sqrt{10}$

22. $ABED$ is a square with sides of length 6. If point C is the midpoint of ED, what is the perimeter of $ABCD$?

 A. 18

 B. $15 + \sqrt{10}$

 C. $18 + \sqrt{10}$

 D. $22 + \sqrt{10}$

 E. 36
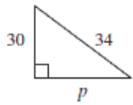
Note: Figure not drawn to scale.

23. In the right triangle above, what is the value of p?

 A. 8

 B. 16

 C. 32

 D. 48

 E. 64

24. In right triangle MNO (not shown), the measure of MN is 6 and the measure of NO is 3. Which of the following could be the measure of OM?

 A. 3

 B. $3\sqrt{3}$

 C. $4\sqrt{3}$

 D. $5\sqrt{3}$

 E. 9
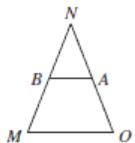
25. In the isosceles triangle MNO above, a segment is drawn between midpoints A and B of the two congruent sides. All the following are true EXCEPT

 A. $\angle M \cong O$

 B. $\angle B \cong A$

 C. $\triangle MNO \sim \triangle BNA$

 D. $BA = MO$

 E. $BN = NA$

26. When the product of 3 and a number is increased by 5, the result is 350. What is the number?

27. If $x = p(p - 3)$, then $x + 2 =$

 A. $p^2 - 3p$

 B. $p^2 + 3$

 C. $p^2 - 3p + 2$

 D. $p^2 + 3p + 2$

 E. $p^2 + 3p$

28. What is the product of $3bm^4$ and $2b^4$?

A. $5mb^8$
B. $6mb^8$
C. $6m^4b^4$
D. $5m^4b^5$
E. $6m^4b^5$

29. If $a^{-3} = b^{-9}$, what is the value of a when $b = 2$?

    A. -2
    B. 0
    C. 2
    D. 4
    E. 5
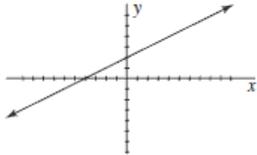
30. The figure above shows the graph of the line $y = ax + b$. Which of the following best represents the graph of $y = 3ax + b$?

A.

B.

C.

D.

E.
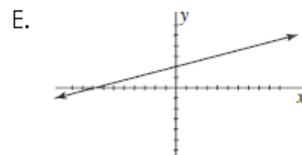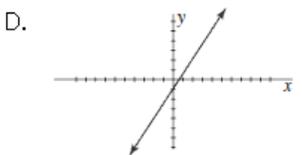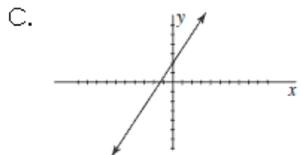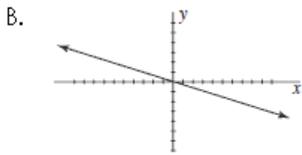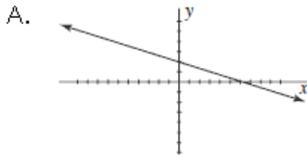
31. For a fund-raiser, the yoga club is selling teeshirts with a choice of two slogans, "Ooommmm" or "Bend me!" Each shirt is available in lavender or peach and in small, medium, or large. How many different types of shirts are available?

32. Kate, Jack, Sawyer, Walt, and Hugo are at the beach. If a team of two people will hike to the caves, how many different such pairs are possible?

    {3, 4, 5, 6, 7, 8}

33. What is the probability of randomly choosing a prime number from the set above?

34. If $2m – 2$, $m + 3$, and $3m – 4$ are all integers and $m + 3$ is the median of these integers, which of the following could be a value for m?

    A. 2
    B. 4

C. 6
D. 8
E. 10

35. If m is a positive constant and $n = 0$, which of the following could be the graph of $y = mx^2 + 3x + n$?

A.

B.

C.

D.

E.
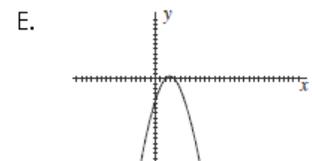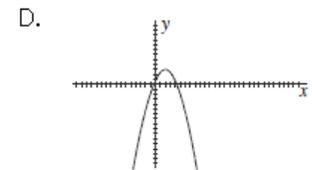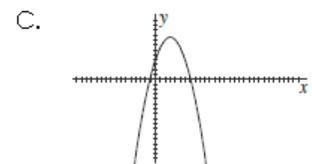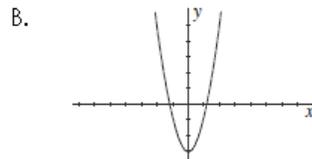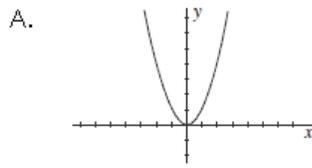
36. If all children in the Lederman family are terrific, which of the following statements must be true?
    A. All terrific children are Ledermans.
    B. All children not in the Lederman family are not terrific.
    C. No children who are not terrific are in the Lederman family.
    D. Everyone in the Lederman family who is terrific is a child.
    E. There are four terrific children in the Lederman family.

37. Which of the following could be the remainders when four consecutive odd integers are each divided by 3 ?
    A. 1, 3, 5, 0
    B. 1, 2, 3, 4
    C. 0, 1, 2, 3
    D. 0, 2, 1, 0
    E. 0, 1, 2, 0

38. Which of the following are solutions to $|x - 2| = 6$?
    I. 8
    II. –4
    III. –3
    A. I only
    B. II only
    C. I and II
   D. I and III
    E. I, II, and III
        6, 10, 18, 34, …

39. In the sequence above, the first term is 6, and every number after the first is found by subtracting 1 and then doubling the result. What is the 7*th* term in the sequence?

    A. 257
    B. 258
    C. 259
    D. 260
    E. 261

      6, 10, 14, 18, …

40. In the sequence above, the first term is 6, and every number after the first is found by adding 4 to the preceding term. What is the 57*th* term in the sequence?

    A. 230
    B. 232
    C. 234
    D. 235
    E. 239

41. When $x = -2$, which of the following is equivalent to $x(2s^2 - 2)$?

    A. $-4s^2 + 4$
    B. $-4s^2 - 4$
    C. $4s^2 - 4$
    D. $4s^2 + 4$
    E. $s^2 - 4$

42. If $x = 2$, then which of the following is equivalent to $(y - x)^2$?

    A. $y - 2$
    B. $y^2 + 4$
    C. $y^2 + 2y + 4$
    D. $y^2 + 4y + 4$
    E. $y^2 - 4y + 4$

43. If point N on the number line above represents -8, and point M (not shown) is between N and -4, which of the following could be represented by point M?

    A. 8
    B. 4
    C. 0
    D. −5
    E. −8
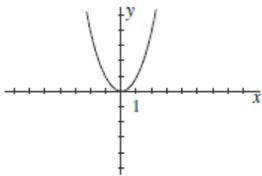
44. The graph of $g(x)$ is shown above. Which of the following equations represents all the points of $g(x)$ shifted 1 unit down?

    A. $y = g(x) + 1$
    B. $y = g(x + 1)$
    C. $y = g(x - 1)$
    D. $y = g(x) - 1$
    E. $y = g(x)$

45. Let $\begin{array}{|c|}\hline a\quad b\\ \hline d\quad c\\\hline\end{array}$ be defined as $\begin{array}{|c|}\hline a\quad b\\ \hline d\quad c\\\hline\end{array} = ac + db$ for all integers a, b, c, and d. What is the value of $\begin{array}{|c|}\hline 3\quad 5\\ \hline 4\quad 6\\\hline\end{array}$?

46. If y is directly proportional to x, and $y = 21$ when $x = 4$, what is x when $y = 35$?

47. If y is inversely proportional to x^2, and $y = \frac{1}{2}$ when $x = 2$, what is x when $y = \frac{1}{8}$?

    A. 4
    B. 2
    C. 1

D. $\frac{1}{8}$

E. $\frac{1}{16}$

48. In a basket of orange and purple crayons, the ratio of orange crayons to purple crayons is 2 to 3. Which of the following could be the total number of crayons in the basket?

    A. 2

    B. 6

    C. 14

    D. 15

    E. 27

       {4, 5, 6, 7, 8, 9}

49. What is the probability of randomly choosing an odd prime number from the set above?

50. The morning of the test you should

    A. Drink 4 Jolt colas to be wide awake.

    B. Feed your brain with a tall stack of flapjacks, a side of pork, and six potatoes.

    C. Run a few miles.

    D. Take a full 4-hour timed practice test.

    E. Have a normal healthy breakfast.

Answers

1. **B** This question looks impossible to some, but "Use the Answers" makes it easy! Try each choice. If $x = 1$, then $8^{1+1} = 2^{1+7}$ or $64 = 256$ which is not true. If $x = 2$, then $8^{2+1} = 2^{2+2}$ or $512 = 512$, so $x = 2$ is correct. Just to be sure, if there is time, you can try each of the other choices to prove that no other choice works and that choice B is correct.

2. **B** "What is m in terms of p?" means solve for m, get m alone. Since $2m = 5n = 6p$, we can say that $2m = 6p$. Divide both sides by 2 and $m = 3p$.

3. **C** The sum of his grades is $10 \times 82 = 820$. The correct sum should have been 14 points higher (for the 5 and 9 points he was cheated on the 2 test grades). So the correct average is $834/10 = 83.4$, rounded to 83.

4. **142** The angles of any 4–sided closed shape add up to 360, so the 4th angle equals $360 - 129 - 48 - 145 = 38$, and x forms a linear pair with 38, so $x = 180 - 38 = 142$.

5. **D** In two parallel lines, all big angles are equal and all small angles are equal. Since $x = 53$, it is a small angle. Redraw the diagram to reflect this. Then y is clearly a large angle and must equal $180 - 53 = 127$.

6. **B** As soon as you know that two sides in a triangle are equal, you know that the two angles opposite the two sides are also equal. Therefore, $a = c$. If $b = 160$, then $a + c + 160 = 180$, and $a + c = 20$. Since a equals c, a is half of 20, which is 10.

7. **30** Since $2x$ is the exterior angle of the triangle shown, $2x = x + 30$. Subtract x from both sides to get $x = 30$.

8. **12** Know your vocab terms and try numbers; the numbers can't be too big if they add up to 42. Or, you can divide 42 by 3 to get the middle number, and work from there. $12 + 14 + 16 = 42$.

9. **18** Know your vocab terms and try numbers. The number 36 is the lowest number that is a multiple of 4, 12, and 18.

10. **C** Don't be intimidated by "xy coordinate plane." It's just the usual grid we use. Same for "ordered pairs," they are just normal (x, y) points. Draw a sketch. Two lines might be parallel and not intersect, or they might intersect in one point, but they cannot intersect twice. To do that, they would have to bend, which unless you live in *The Matrix*, straight lines do not do.

11. **C** Plug the two points into the slope equation: $\frac{3-0}{2-(-1)} = \frac{3}{3} = 1$

12. **C** Parallel lines have equal slopes, so the slope of the line is 3, and slope $= \frac{3-p}{-1-(-2)} = 3$. "Use the Answers" or cross–multiply to solve for p · $p = 0$.

13. **E** The legend tells us that each ♥ represents 20 votes. Therefore, Scary received 90 votes and Posh Spice received 60, and $90 - 60 = 30$. Notice that half a heart equals half of 20, not half of 1.

14. **B** $f(-1) = -3(-1)^2 - 2 = -3 - 2 = -5$

15. **B** This is a very common question on the SAT, showing up very often on recent tests. To solve, simply choose a pair of values such as (2, 6) and plug them into the answer choices for x and $f(x)$ to see in which choice the values work. Remember that $f(x)$ simply means y, so the table of values is a typical (x, y) table. To be sure of your answer, test the pair in all choices. If two answer choices work, choose a second (x, y) pair to determine which one is correct.

16. **C** This question seems theoretical and intimidating to some, but not to us with "Make It Real." Choose a real number in for t (remember, the question says that it must be negative). Let's say $t = -3$. Then try -3 for t in each answer choice to see which one does what the question asks, which one yields a positive number. If you get two or more answers that work, choose another real number for t until you get only one answer choice that works. Choice C is the answer since $3 - (-3) = 6$; in fact, subtracting a negative will always make it positive and that's why this is always the correct answer.

17. **D** Since the radius of circle B is half the diameter of circle A, it must be 8. Therefore, the area of circle B is Area $= \pi r^2 = \pi 8^2 = 64\pi$. You can also just check the scale on the figure, and, if needed, redraw the picture to scale to estimate which answer is correct.

18. **C** Perimeter is the addition of the sides. Since the perimeter of square $BCDF$ is 24, each side is 6. $AB = 12$ and $DE = 4$. Perimeter of the shaded region $= 18 + 4 + 6 + 6 + 12 + 10 = 56$.

19. **D**   Remember that 1.4 to 2 is the same as saying "1.4 divided by 2," so just divide 1.4/2 on your calculator to get 0.7. Then divide each answer choice to see which one also gives 0.7. Easy!

20. **D**   Set up the proportion and cross–multiply. $\frac{3}{35} = \frac{3.5}{x}$, so $3x = 122.5$. Divide by 3 to get $x = 40.83$ or $40\frac{5}{6}$. If the fractions in the answer choices scare you, just convert them to decimals.

21. **C**   Draw point M into the diagram and estimate MD. Using geometry, this is a "hard" question because there are two steps using the Pythagorean theorem. But with "Use the Diagram," it's easy! If AB is 20, BC is 8, and DC is 4, then MD looks like somewhere between 10 and 15, probably in the middle. Translate the answer choices to decimals, and Choice C is correct.

22. **B**   Easy, if you draw a diagram! The diagram shows that the sides of $ABCD$ are 6, 6, 3, and 7ish. So only answer choice B works. You could also use the Pythagorean theorem to get the exact length of side CB.

23. **B**   Use the Pythagorean theorem.

$$30^2 + p^2 = 34^2$$
$$900 + p^2 = 1156$$
$$p^2 = 256$$
$$p = 16$$

24. **B**   Draw a diagram. When you see a right triangle, try $a^2 + b^2 = c^2$. You can also use special right triangles if you notice that 3 is half of 6.

25. **D**   Triangles NBA and NMO are isosceles so base angles are equal. The triangles are similar since they also share a vertex angle ($\angle N$).

26. **115**   Translate the words to math and solve. $3n + 5 = 350$. Subtract 5 from both sides and then divide by 3 to get 115.

27. **C**   If you see something that can be multiplied, do it. $p(p - 3) = p^2 - 3p$, so $x = p^2 - 3p$. To find $x + 2$, we just add 2 to both sides to get $x + 2 = p^2 - 3p + 2$.

28. **E**   Good vocab review, "product" means multiply. So $(3bm^4)(2b^4) = 6m^4b^5$. Notice that I did not add the exponents $4 + 4$ because m and b are different letters, and we add only when the letters are the same. Also, notice that the order of the variables does not matter; mb is the same as bm.

29. **E**   If $b = 2$, then $a^{-3} = (2)^{-9}$ or $a^{-3} = \frac{1}{2^9} = 0.002$. This is a "hard" question because most students get intimated by the negative exponents, and give up, but with our strategies, it's easy. Just "Use the Answers." Try each answer choice to find which one works. Choice E works since $(8)^{-3} = 0.002$.

30. **C**   The graph shown represents $y = ax + b$, and we want an answer that shows $y = 3ax + b$. So we want a line that is 3 times steeper than the one in the question, and since b did not change, we want the same y intercept. So choice C is correct.

31. **12**   Draw a blank for each option. Then write in the number of possibilities that can fill each option. There are 2 possibilities for slogan, 2 for shirt color, and 3 for size, so $\underline{2} \times \underline{2} \times \underline{3} = 12$

32. **10**   Draw a blank for each member of the pair. Write in the number of people who can fill each blank; remember that once someone is assigned a position, that person cannot also fill the other spot. Then multiply. This question has one extra step. Since this is a team of two and it does not matter if it's Kate and Jack or Jack and Kate, we divide our answer by 2, since we will have doublecounted each duo.

$$\underline{5} \times \underline{4} = 20 \div 2 = 10$$

33. $\frac{1}{2} = 0.5$. Probability $= \frac{want}{total}$, so the probability of selecting a prime number is $\frac{3}{6}$ which reduces to $\frac{1}{2}$ or 0.5. Remember, you need to reduce to get credit; the machine would not accept $\frac{3}{6}$ as the correct answer. Repeat after me, "Reducing is my friend …" or just use your calculator to get a decimal.

34. **B**   Simply plug each answer in for the variable. If $m = 2$, then the three numbers in the list are 2, 5, 2. $m + 3$, which equals 5, is not the median. But when $m = 4$, the three numbers are 6, 7, 8. Thus, $m + 3$, which equals 7, is the middle number.

35. **A**   We love these! Since m is positive, the U–shaped graph must open up and since n is zero, the y intercept must be zero. Choice A is the answer!

36. **C**   If all children in the Lederman family are terrific, than obviously there are "no children who are not terrific in the Lederman family." Easy. The only way to get this one wrong is to rush into one of the wrong choices or to doubt yourself and say, "I don't get this, I'll just go with B." But if you stay relaxed and focused and confident, you can easily see why choice C is the correct answer.

37. **D**   Nice vocab review. Remember that "consecutive" means in a row, "odd" means numbers like 1, 3, 5, 7, 9, and "integer" means no decimals. So just choose 4 consecutive odd integers and divide each by 3 to see the remainder for each. Depending on the numbers you chose, the correct answer might be in a different order than your numbers.

38. **C**   "Use the Answers." Try each answer choice in the equation.

   I. $|8 - 2| = 6$ correct
   II. $|-4 - 2| = |-6| = 6$ correct
   III. $|-3 - 2| = |-5| - 5 \neq 6$ incorrect

   So I and II are correct and choice C is the answer.

39. **B**   This is sequence question. Continue the sequence until you have seven terms: 6, 10, 18, 34, 66, 130, **258**.

40. **A**   Since we add 4 to each new term, by the 57th term, we have added 56 times 4, which equals 224. Thus the 57th term equals 224 plus the original 6, which makes 330.

41. **A**   Plug $x = -2$ and simplify. $x(2s^2 - 2) = -2(2s^2 - 2) = -4x^2 + 4$. Careless error buster: Remember to distribute the negative sign!

42. **E**   Plug 2 in for x and then FOIL $(y - 2)^2$. You can use the algebra trick for FOILing a binomial if you know it; and if you don't, no sweat, just do it out: $(y - 2)^2 = (y - 2)(y - 2) = y^2 - 2y - 2y + 4 = y^2 - 4y + 4$. Careless error buster: When you FOIL, remember the middle term!

43. **D** Point M is between –4 and –8 on the number line, so D is the only choice that works.

44. **D** This is a straightforward transformation. The parent function $g(x)$ needs to be shifted 1 unit down. If you memorize the transformations, this question is easy; a down transformation would be $y = g(x) - 1$. If you did not memorize the transformations, get to it, you silly slacker. Or, you could graph each choice on your calculator and see which one yields results that are all 1 unit down from the parent.

45. **38** This is a "weird symbol" question. You are not alone; no one has ever seen the symbol for this operation. It's not just because you dropped Precalc to get into Modern Interpretations of Shakespeare class. Just follow the directions given, and it's easy. $4 \boxed{\begin{smallmatrix}3 & & 5\end{smallmatrix}} 6 = (3)(6) + (4)(5) = 38$

46. $\frac{20}{3} = 6.66$. "y is directly proportional to x" Means $\frac{y}{x}$. So we set up a proportion between the two sets of (x, y) values and solve for the unknown x. $\frac{y}{x} = \frac{y}{x} \Rightarrow \frac{21}{4} = \frac{35}{x}$ $21x = (4)(35) \Rightarrow 21x = 140 \Rightarrow x = \frac{20}{3} = 6.66$ On the SAT, you can grid 20/3 or 6.66 or 6.67. You can round or just chop, but when you have a long decimal, you must fill up all four of the grid spaces, i.e., 6.66.

47. **A** "y is inversely proportional to x^2" means $y = \frac{k}{x^2}$. Plug the first pair of values into this equation to find the value of k. $\frac{1}{2} = \frac{k}{2^2}$. So, $2k = 4$ and $k = 2$. Now, using $k = 2$, plug the second pair of values $(x, \frac{1}{8})$ into the equation. $\frac{1}{8} = \frac{2}{x^2}$. Cross–multiply $x^2 = 16$, so $x = 4$.

48. **D** There are 2 oranges to every 3 purple crayons, so there are 5 total, or actually some multiple of 5, so choice D is correct.

49. $\frac{1}{3} = 0.3333$, Probability $= \frac{want}{total}$, so the probability of selecting an odd prime number is $\frac{2}{6}$ which reduces to $\frac{1}{3}$ or 0.333. Remember, you need to reduce to get credit, the machine would not accept $\frac{1}{3}$ as the correct answer. Also, you can grid 1/3 or 0.333, you can round or just chop; but when you have a long decimal, you must fill up all four of the grid spaces, i.e., 0.333.

50. **E**

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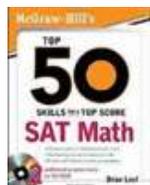
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