

Specialized High Schools Admissions Test (SHSAT) - Practice Test for 2024 Admissions



امتحان القبول بالمدارس الثانوية المتخصصة (SHSAT)
امتحان تجريبي للإلحاق في عام 2024

স্পেশালাইজড হাই স্কুলস অ্যাডমিশন্স টেস্ট (SHSAT)
2024 সালের ভর্তি পরীক্ষার অনুশীলনী

特殊高中入學測驗 (SHSAT)
模擬測驗 (2024年入學)

Test d'entrée en lycée spécialisé (SHSAT)
Examen blanc pour les admissions de 2024

Examen de admisión nan lekòl segondè espesyalize (SHSAT)
Tès pratik pou admisyon 2024

특수목적 고등학교 입학 시험 (SHSAT)
2024년도 전형 대비 모의 시험

Экзамен в специализированные средние школы (SHSAT)
Тренировочный тест для поступления в среднюю школу в 2024 г.

Examen de admisión a las escuelas secundarias especializadas (SHSAT)
Examen de práctica para las admisiones de 2024

متخصص بائی اسکول داخلہ امتحان (SHSAT)
2024 داخلوں کے لیے مشقیہ امتحان

Form B Math

GRID-IN QUESTIONS

QUESTIONS 58-62

DIRECTIONS: Solve each problem. On the answer sheet, write your answer in the boxes at the top of the grid. Start on the left side of each grid. Print only one number or symbol in each box. Under each box, fill in the circle that matches the number or symbol you wrote above.

- Do not fill in a circle under an unused box.
- Do not leave a box blank in the middle of an answer.

58.

LAST YEAR'S TOTAL SALES

Vehicles	Number
Four-door cars	5,850
Two-door cars	2,250
Trucks	900
Total	9,000

The table above shows the number of each type of vehicle sold at a dealership last year. If 1,000 vehicles will be sold next month, what is the best estimate (based on last year's sales) of the number of two-door cars that will be sold?

$$\text{ratio: } \frac{\text{two-door cars}}{\text{total cars}} = \frac{2250}{9000}$$

$$\frac{2250}{9000} = \frac{\text{est}}{1000} \quad \text{number to be sold}$$

$$\text{est} = \frac{2250 \times 1000}{9000} = \frac{2250}{9} = 250$$

$$\begin{array}{r} 250 \\ 9 \overline{) 2250} \end{array}$$

59. In a scale drawing of a rectangular garden, the length is 15 inches and the width is 9 inches. In the drawing, 2 inches represents 3 yards. What is the width of the actual garden, in yards?

Scale: $\frac{2 \text{ in}}{3 \text{ yds}}$

Set up a proportion

$$\frac{2 \text{ in}}{3 \text{ yds}} = \frac{9 \text{ in}}{x \text{ yds}} \quad \left| \quad \frac{27}{2} = \frac{2x}{2} \quad \left| \quad x = 13.5 \text{ yds} \right.$$

60. A kindergarten teacher has 72 crayons, 60 pencils, and 84 sheets of paper to distribute to the children in her class. If each child receives an equal number of each item and there are no items remaining, what is the greatest possible number of children in the class?

the underlying concept is greatest common factor (GCF)
GCF(72, 60, 84):

divide by low primes

$$\begin{array}{l} \textcircled{2} \mid 72, 60, 84 \\ \textcircled{2} \mid 36, 30, 42 \\ \textcircled{3} \mid 18, 15, 21 \\ \text{GCF} = 2 \times 2 \times 3 = \textcircled{12} \end{array}$$

multiply these

no common divisors left: 6, 5, 7

61. Mr. Smith opened a retirement account with a deposit of \$900. This account earns 5% simple interest annually. How many years will it take for his \$900 deposit to earn \$360 interest?

Simple = principle * rate * time
interest

$$360 = 900 \times \frac{5}{100} \times t$$

$$t = \frac{360}{900} \times \frac{100}{5} = \frac{40}{5} = 8$$

62. Solve the equation for x:

$$\frac{(21)(14)x}{(49)(48)} = 0.875$$

$$\frac{\overset{3}{\cancel{21}} \times \overset{2}{\cancel{14}}}{\cancel{49} \times 48} = \frac{6}{48} = \frac{1}{8}$$

$$\frac{x}{8} = 0.875$$

as you know, $\frac{7}{8}$ is .875
therefore $x = 7$

MULTIPLE CHOICE QUESTIONS

QUESTIONS 63–114

DIRECTIONS: Solve each problem. Select the answer from the choices given. Mark the letter of your answer on the answer sheet. When you are solving problems, you can write in the test booklet or on the scrap paper given to you.

63. What is the value of

$$3\frac{1}{4} - 1\frac{2}{3} - (-4\frac{1}{2})?$$

A. $-3\frac{1}{12}$

B. $-2\frac{11}{12}$

C. $6\frac{1}{12}$

D. $9\frac{5}{12}$

Handwritten work for Question 63:

$$3\frac{1}{4} - 1\frac{2}{3} - (-4\frac{1}{2})$$

$$= 3\frac{1}{4} + 4\frac{1}{2} - 1\frac{2}{3}$$

$$= 7\frac{3}{4} - 1\frac{2}{3}$$

$$= 7\frac{9}{12} - 1\frac{8}{12} = 6\frac{1}{12}$$

64. On Fran's map, 2 centimeters represents 3 kilometers. The points on this map that represent Fran's home and Bryant State Park are 4.5 centimeters apart. How many kilometers apart are Fran's home and Bryant State Park, to the nearest kilometer?

E. 3

F. 5

G. 7

H. 9

Handwritten work for Question 64:

Scale: $\frac{2 \text{ cm}}{3 \text{ km}}$

$$\frac{2 \text{ cm}}{3 \text{ km}} = \frac{4.5 \text{ cm}}{x}$$

$$2x = 4.5 \times 3 = 13.5$$

$$x = \frac{13.5}{2} = 6.75$$

rounds to **7**

65. Solve for x in terms of y if $2x + 4 = y$.

A. $x = \frac{y - 4}{2}$

B. $x = 2(y + 4)$

C. $x = \frac{y + 4}{2}$

D. $x = 2(4 - y)$

Handwritten work for Question 65:

$$2x + 4 = y$$

$$2x = y - 4$$

$$x = \frac{y - 4}{2}$$

66. Bryan completed a 100-meter race in 11.74 seconds. Luis completed the same race in 11.69 seconds. What was the difference between their times, expressed as a fraction of a second?

E. $\frac{1}{20}$

F. $\frac{1}{10}$

G. $\frac{3}{20}$

H. $\frac{1}{5}$

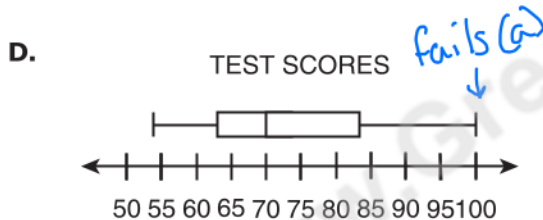
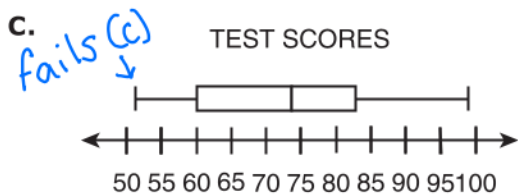
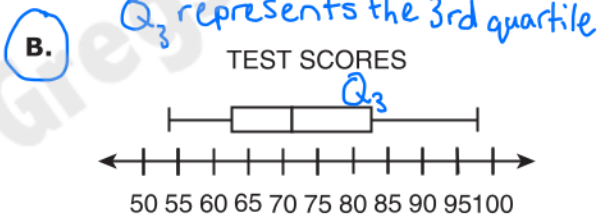
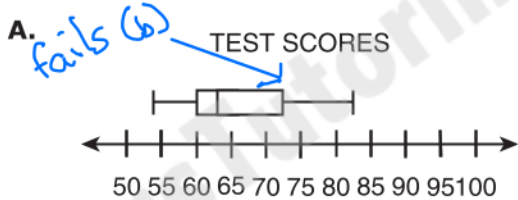
Handwritten work for Question 66:

$$\begin{array}{r} 11.74 \\ -11.69 \\ \hline 0.05 = \frac{5}{100} = \frac{1}{20} \end{array}$$

67. A total of 24 students in a math class took a 100-point test:

- (a) • None of the students scored 100 points.
- (b) • 75% of the students scored less than 82 points.
- (c) • The lowest score in the class was 54 points.

Which box plot best represents the test scores from this math class?



FYI:

Inter Quartile Range (IQR)
 $IQR = Q_3 - Q_1$

68.

$$n = 0.13 + \frac{207}{100}$$

What is the value of n expressed as a fraction?

E. $\frac{1}{3}$

F. $\frac{11}{5}$

G. $\frac{9}{4}$

H. $\frac{23}{10}$

$$\frac{13}{100} + \frac{207}{100} = \frac{220}{100} = \frac{11}{5}$$

69. The perimeter of a 12-sided polygon is 100 centimeters. The length of one side is 25 centimeters. The length of another side is 35 centimeters. The remaining sides are equal in length to one another. What is the length of each of the remaining sides, in centimeters?

- A. 4 *(no unit conversion needed)*
- B. 5 *12 sides - 25 cm side*
- C. 20 *35 cm side means 10 sides left*
- D. 40 *sides left*

$$\text{remaining} = 100 - 25 - 35 = 40$$

$$\frac{40 \text{ cm}}{10 \text{ sides}} = 4 \text{ cm/side}$$

70. Shiow-Chen has a box that contains 4 green cards, 7 yellow cards, and 6 red cards. She randomly draws one card at a time from the box and does not return the cards to the box after they have been drawn. The first card she draws is yellow. The second card she draws is green. What is the probability that the third card she draws will also be green?

- E. $\frac{1}{5}$
 F. $\frac{4}{17}$
 G. $\frac{1}{4}$
 H. $\frac{1}{3}$
- Handwritten work for 70:
 4 gr 3
 7 y 6
 17 total
 16 15
 first second third
 $\frac{7y}{17}$ $\frac{4}{16}$ $\frac{3}{15} = \frac{1}{5}$

71. Each number in a sequence is 3 more than twice the number that comes just before it. If 93 is a number in the sequence, what number comes just before it?

- A. 92
 B. 90
 C. 48
 D. 45
- Handwritten work for 71:
 $n = 2p + 3$
 $93 = 2p + 3$
 -3
 $90 = 2p$
 $\frac{90}{2} = \frac{2p}{2}$
 $45 = p$

72. On a map, the distance between Deshawn's house and Xin's house is 5.4 inches. If 2 inches on the map represents 3 miles, what is the distance between these two houses, in miles?

- E. 2.6
 F. 3.6
 G. 7.5
 H. 8.1
- Handwritten work for 72:
 Scale: $\frac{2 \text{ in}}{3 \text{ miles}}$
 $\frac{2 \text{ in}}{3 \text{ miles}} = \frac{5.4 \text{ in}}{d \text{ miles}}$
 $\frac{2d}{2} = \frac{3 \times 5.4}{2}$
 $d = 8.1$

73.



This wheel has 15 spokes, equally spaced. What is the measure of the angle between adjacent spokes?

- A. 30°
 B. 24°
 C. 15°
 D. 12°
- Handwritten work for 73:
 A circle has 360° .
 15 equally spaced spokes means 15 equally spaced parts
 Therefore $\frac{360}{15} = 24^\circ$

Check

$$\begin{array}{r} 24 \\ \times 15 \\ \hline 120 \\ + 240 \\ \hline 360 \checkmark \end{array}$$

74.

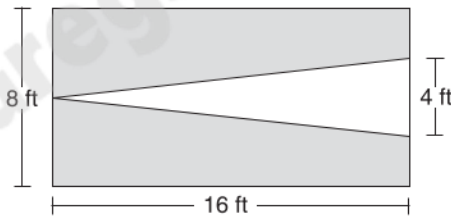
$$m \cdot t = 72$$

For the equation above, what is the sum of the values of m when $t = 1$, when $t = 2$, and when $t = 3$?

- E. 12 $m \times t = 72$
 F. 72 $m \times 1 = 72 \therefore m = 72$
 G. 132 $m \times 2 = 72 \therefore m = 36$
 H. 135 $m \times 3 = 72 \therefore m = 24$

$$\begin{array}{r} 72 \\ +36 \\ +24 \\ \hline 132 \end{array}$$

75.



The diagram above shows a rectangle with an inscribed triangle. The triangle's vertex and base touch the sides of the rectangle as shown. What is the total area of the shaded portion?

- A. 32 sq ft $A_{\text{shaded}} = A_{\text{rect}} - A_{\text{tri}}$
 B. 64 sq ft
 C. 96 sq ft
 D. 128 sq ft

$$A_{\text{rect}} = l \times w = 16 \times 8 = 128$$

$$A_{\text{tri}} = \frac{1}{2}bh = \frac{1}{2} \times 4 \times 16 = 32$$

$$A_{\text{shaded}} = 128 - 32 = 96$$

76. Orange juice costs \$2 per gallon, and grapefruit juice costs \$3 per gallon. A recent shipment of equal amounts of the two types of juice costs a total of \$250. How many gallons of orange juice are in the shipment?

- E. 50 $\text{Price}_{\text{OJ}} = \2
 F. 62.5 $\text{Price}_{\text{GF}} = \3
 G. 100
 H. 125

equal amounts so

$$\text{Amount}_{\text{OJ}} = \text{Amount}_{\text{GF}}$$

$$2\text{Amount}_{\text{OJ}} + 3\text{Amount}_{\text{GF}} = 250$$

Substitute $\text{Amount}_{\text{GF}}$

$$2\text{Amount}_{\text{OJ}} + 3\text{Amount}_{\text{OJ}} = 250$$

$$5\text{Amount}_{\text{OJ}} = 250$$

$$\text{Amount}_{\text{OJ}} = \frac{250}{5} = 50$$

77. Five consecutive numbers have a sum of 110. What is the **least** of these consecutive numbers?

- A. 11
- B. 18
- C. 20**
- D. 22

x and x+1 are consecutive

$$x + x + 1 + x + 2 + x + 3 + x + 4 = 110$$

$$5x + \cancel{10} = \cancel{110} - \cancel{10}$$

$$5x = 100$$

$$x = 20$$

check

$$20 + 21 + 22 + 23 + 24 = 110 \checkmark$$

78.

- $-mn$
- $(-m)(-n)$
- $|mn|$
- $|-mn|$
- $|(-m)(-n)|$

If m and n are positive integers, how many of the five expressions above are equivalent to mn ?

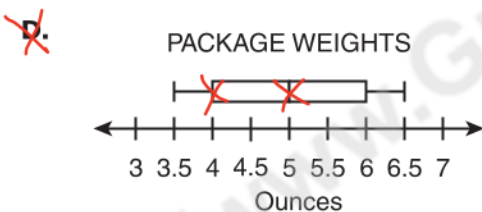
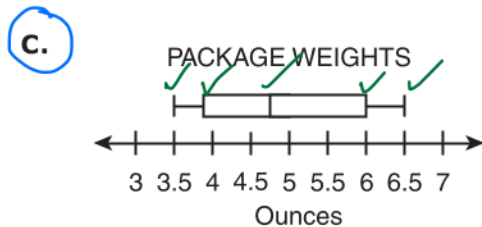
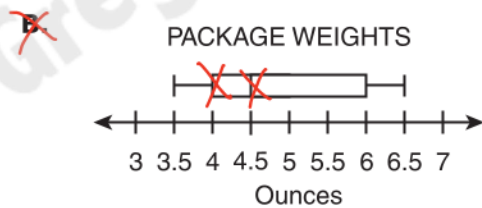
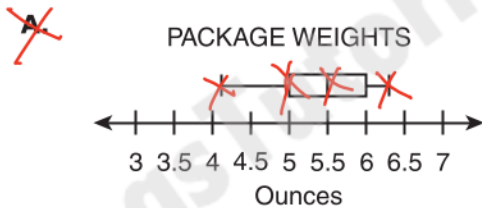
- E. 1 mn ; $\text{pos} \times \text{pos} = \text{pos}$ ^{target expression}
- F. 2 $-mn$; $-\text{pos} = \text{neg}$
- G. 3 $(-m)(-n)$; $\text{neg} \times \text{neg} = \text{pos}$
- H. 4** $|mn|$: absolute value yields pos
 $|-mn|$: so also pos
 $|(-m)(-n)|$: so also pos

min Q_1 median Q_3 max
 3.5, 3.8, 3.9, 4.5, 4.6, 4.7, 4.8, 5.4, 6.0, 6.2, 6.5

79. A vendor is selling 10 packages of homemade fudge at a bake sale. The vendor weighed and labeled each package. The package weights are given in ounces:

4.6 6.0 3.8 3.5 4.5
 5.4 3.9 6.5 4.8 6.2

The vendor created a box plot of the package weights. Which box plot best represents the data?



80.

FRUIT SOLD AT STORE XYZ

Fruit	Number Sold
Apples	8
Bananas	6
Cherries	12
Oranges	+ 6 / 32
Peaches	?
Total	50

Add these

+ 6 / 32

~~32~~
18

Peaches made up what percentage of the total number of pieces of fruit sold at Store XYZ, according to the table above?

- E. 18%
- F. 28%
- G. 36%**
- H. 64%

$$\frac{18}{50} = \frac{36}{100} = 36\%$$

81. A prism is made up of 9 congruent cubes. Each of the cubes has side lengths measuring 4 units. What is the volume, in cubic units, of the prism?

- A. 108
- B. 144
- C. 480
- D. 576**

"cc"

$$V_{cc} = lwh = 4 \times 4 \times 4 = 4^3 = 64 \text{ units}^3$$

$$V_{\text{prism}} = n \times V_{cc} = 9 \times 64 = 576$$

82. The town of Waterville covers an area of 50 square miles. In 2005, its population was 84,000. In 2006, its population had decreased so that the average population per square mile was equal to 1,500. What was the total decrease in population from 2005 to 2006?

- E. 7,500
- F. 8,400
- G. 9,000
- H. 9,200

Handwritten solution for Question 82:

2005: 84000
 50 sq miles
 2006: 1500
 1 sq miles

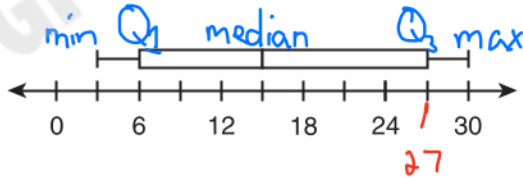
$$\frac{1500}{1} = \frac{P}{50}$$

$$P = 1500 \times 50 = 75000$$

84000
 - 75000

 9000

83. The box plot below represents a set of data.



What is the interquartile range of the set of data?

- A. 9
- B. 12
- C. 21
- D. 27

Inter Quartile Range is IQR
 $IQR = Q_3 - Q_1 = 27 - 6 = 21$

84. $N = \{6, 7, \dots, 21, 22\}$

Handwritten: $22 - 6 = 16 + 1 = 17$ consecutive integers

Set L (not shown) is a list of 25 consecutive integers. The median of the integers in set N above is equal to the least integer in set L. What is the median of the integers in set L?

- E. 25
- F. 26
- G. 27
- H. 28

Handwritten solution for Question 84:

The median of N is its center integer. That would be the 9th integer, which would be 14.

We're told the median of N is the minimum of L. Since L contains 25 elements the median of L must be its 13th integer. That's $14 + 13 - 1 = 26$.

85. The sum of the numbers x, y, and z is 40. The ratio of x to y is 1:2, and the ratio of y to z is 2:5. What is the value of y?

- A. 2
- B. 4
- C. 8
- D. 10

Handwritten solution for Question 85:

$$x + y + z = 40$$

Align the y columns

$$\begin{array}{l} x:y \\ 1:2 \\ y:z \\ 2:5 \\ \hline x:y:z \\ 1:2:5 \end{array}$$

1:2:5 is 8 parts

Since x, y, z sum to 40 and are comprised of 8 parts:

$$\frac{8p}{8} = \frac{40}{8} \quad p = 5$$

If each part represents 5 then the ratio 1:2:5 represents 5, 10, 25

check: $5 + 10 + 25 = 40$

x and $x+1$ are consecutive
 $x+x+1+x+2+x+3=4x+6$

86. Which number could be the sum of 4 consecutive integers?

E. -12 $4x+6 = -12$ $4x = -18$
 $x = \frac{-18}{4} = -4\frac{2}{4}$ ✗

F. -10 $4x+6 = -10$ $4x = -16$
 $x = -4$ ✓

G. -8 $4x+6 = -8$ $4x = -14$
 $x = \frac{-14}{4} = -3\frac{2}{4}$ ✗

H. -4 $4x+6 = -4$ $4x = -10$
 $x = \frac{-10}{4} = -2\frac{2}{4}$ ✗

If while solving any of these there is a remainder then x cannot be an integer

87.

PRICE OF A USED VIDEO GAME AT VARIOUS STORES

Price of Used Video Game	Number of Stores
\$10.99	5
\$11.99	2
\$12.99	1
\$13.99	+ 4

12 total

The table above shows the price of a certain used video game at 12 different stores. What is the median price of this video game?

A. \$10.99
 B. \$11.49
 C. \$11.99
 D. \$12.32

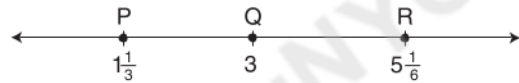
There are 5 @ 10.99 on the low end. On the high end the highest 5 are all 12.99 and 13.99
 That leaves 2 @ 11.99
 Therefore 11.99 is the median

88. If $xy = 30$, what is the value of $10 \div x$ in terms of y ?

E. $\frac{1}{10}y$
 $xy = 30$
 $\frac{xy}{y} = \frac{30}{y}$
 $x = \frac{30}{y}$

F. $\frac{1}{3}y$
 $10 \div x = 10 \div \frac{30}{y}$
 KCF = Keep Change Flip
 division by a fraction is multiplication by its reciprocal
 So $10 \div \frac{30}{y} = 10 \times \frac{y}{30} = \frac{10y}{30} = \frac{y}{3}$

89.



On the number line above, how many units longer is \overline{QR} than \overline{PQ} ?

A. $\frac{1}{6}$ $5\frac{1}{6} - 3 = 2\frac{1}{6}$
 $3 - 1\frac{1}{3} = 1\frac{2}{3}$

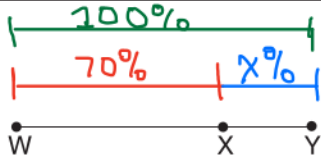
B. $\frac{1}{2}$ $2\frac{1}{6} - 1\frac{2}{3} = 1\frac{2}{6} - 1\frac{4}{6} = -\frac{2}{6} = -\frac{1}{3}$

C. $\frac{2}{3}$

D. 3

$\frac{3}{6} = \frac{1}{2}$

90.



$$100\% - 70\% = 30\%$$

The distance from W to X is 70% of the distance from W to Y. If the distance from X to Y is 15 miles, what is the distance, in miles, from W to X?

- E. 10.5
- F. 35**
- G. 45
- H. 50

$$WX = \frac{70}{100} WY$$

$$XY = 15 \text{ see above}$$

$$\therefore XY = \frac{30}{100} WY$$

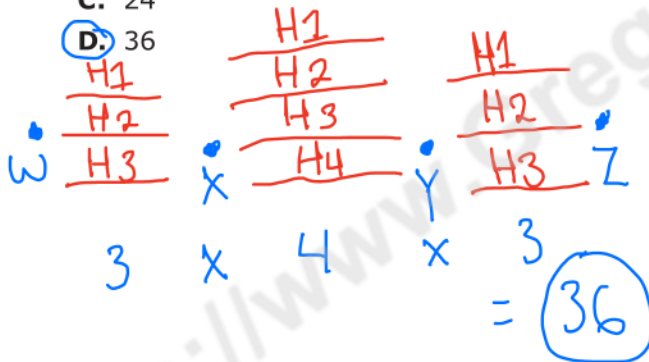
$$\frac{100}{30} \times 15 = \frac{30}{100} WY \times \frac{100}{30}$$

$$WY = \frac{1500}{30} = 50$$

$$\frac{70}{100} \times 50 = \boxed{35}$$

91. There are 3 different highways from City W to City X, 4 different highways from City X to City Y, and 3 different highways from City Y to City Z. How many different routes are there for a trip from City W to City X to City Y to City Z?

- A. 10
- B. 12
- C. 24
- D. 36**



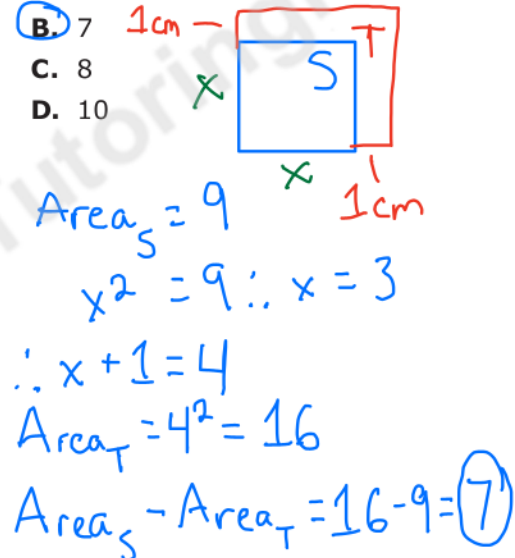
92. In Center City, the ratio of people to dogs is 4:1, and the ratio of dogs to cats is 3:2. What is the ratio of people to cats?

- E. 2:1
- F. 7:3
- G. 6:1**
- H. 12:1

Align the d columns.
Scale each ratio 3:2 to each other
 $\frac{4}{1} = \frac{12}{3}$
 $\frac{P}{C} = \frac{12 \cdot 3}{2} = \frac{6}{1} = \boxed{6:1}$

93. The side length of square S is shorter than the side length of square T by 1 centimeter. The area of square S is 9 square centimeters. What is the difference, in square centimeters, between the area of square T and the area of square S?

- A. 3
- B. 7**
- C. 8
- D. 10



94. Which expression is equivalent

to $\frac{1}{2}x + 7 - \left(x - \frac{9}{2}\right)$?

E. $\frac{1}{2}(x - 5)$ $-\downarrow x + \frac{9}{2}$

F. $\frac{1}{2}(x + 5)$

G. $-\frac{1}{2}(x + 23)$ $\frac{9}{2} = 4\frac{1}{2}$

H. $-\frac{1}{2}(x - 23)$
 $\frac{1}{2}x + 7 - x + \frac{9}{2} = -\frac{1}{2}x + 7 + \frac{9}{2}$
 $-\frac{1}{2}x + 11\frac{1}{2} = -\frac{1}{2}x + \frac{23}{2} = -\frac{1}{2}(x - 23)$

95. How is $\frac{1}{x} - \frac{1}{2x}$ written as a single fraction? (Assume $x \neq 0$.)

A. $\frac{1}{2x}$ $\frac{1}{x} \times \frac{2}{2} - \frac{1}{2x}$

B. $\frac{1}{3x}$ $\frac{2}{2x} - \frac{1}{2x} = \frac{1}{2x}$

C. $-\frac{1}{x}$ Since $\frac{2}{2}$ is 1 we have

D. $-\frac{1}{2x}$ not changed $\frac{1}{x}$ but we have made it a "like term" with $\frac{1}{2x}$

96. In a certain competition, 1 person finished in first place, 5 people tied for second place, 10 people tied for third place, and the other 4,984 people did not place. What percentage of the people in the competition placed first, second, or third altogether?

E. 0.0032%

F. 0.032%

G. 0.32%

H. 3.2%

Placed	Tied
1st	1
2nd	5
3rd	10
Didn't	4984

Total = $1 + 5 + 10 = 16$
 $\frac{16}{5000} \times \frac{2}{2} = \frac{32}{10000}$
 $\frac{32}{100} \times \frac{1}{100} = 0.32\%$ % literally means divided by 100

97. Angle A and angle B are complementary.

If the measure of angle B is three times as great as the measure of angle A, what is the measure of angle B?

A. 45°

B. 67.5°

C. 75°

D. 135°

Comp. 90 ←
 Supp. 180
 $A + B = 90$
 $B = 3A$
 Substitute B in first equation
 $A + 3A = 90$
 $4A = 90$
 $A = 22.5$
 $\therefore B = 67.5$
 (can also substitute for A)

98. The height of a tree in 2013 is 300% of the height it was in 2003. By what percentage did its height increase over this ten-year period?

E. $33\frac{1}{3}\%$

F. 100%

G. 200%

H. 300%

2013: 300%
 2003: 100%
 $\frac{\text{New-Old}}{\text{Old}} = \frac{200}{100} = 200\%$

99.

1 gallon = 16 cups
 1 cup = 8 fluid ounces

If 1 gallon = 2^x fluid ounces, what is the value of x ?

A. 4

B. 7

C. 8

D. 64

$\frac{16}{16 \text{ cups}} \times \frac{1 \text{ cup}}{8 \text{ fl. oz.}} = \frac{16}{128 \text{ fl. oz.}}$

$16 = 2^x$

$128 \text{ fl. oz.} = 2^x$

$128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^7$

$2^7 = 2^x \therefore x = 7$

100. A certain square puzzle has an area of 64 square inches, and a cubic block has a volume of 64 cubic inches. What is the ratio of the length of a side of the puzzle to the length of a side of the block?

E. 1:3

F. 1:2

G. 2:3

H. 2:1

Area square = 64 in^2
 $\therefore \text{side square} = \sqrt{64} = 8 \text{ in}$
 $V_{\text{cube}} = 64 \text{ in}^3 \therefore \text{side cube} = \sqrt[3]{64} = 4 \text{ in}$
 $\frac{\text{Side square}}{\text{Side cube}} = \frac{8}{4} = \frac{2}{1}$

101. In a certain class, Rosa will take a total of 4 tests. She has already taken 2 of the tests and earned scores of 81 and 83.

What is the least possible score Rosa can earn on the third test and still be able to finish the class with an average score of 85 on all 4 tests? (Assume that test scores can range from 0 to 100.)

A. 76 $\text{Avg} = \frac{\text{sum \#s}}{\text{\# \#s}}$

B. 82

C. 88 T3 reflects the third test

D. 90 T4 reflects the fourth test

For T3 to be the least possible then T4 would be the most possible. So T4 would be 100.

$85 = 83 + 81 + T3 + 100$

$340 = 83 + 81 + T3 + 100$

$340 = 264 + T3$

$-264 -264$

$76 = T3$

- 102.** ^B The Barnes family and the ^RRamirez family each have a pizza of equal size. The first pizza is cut into 18 equal slices, and the second pizza is cut into 15 equal slices. If the Barnes family eats 11 slices from the first pizza, what is the greatest number of whole slices from the second pizza that the Ramirez family can eat without eating a greater percentage of a pizza than the Barnes family ate?

- E. 6 *Equal pizzas*
 F. 7
 G. 8 *B=R* $\frac{11B_{eaten}}{18B_{total}} > \frac{nR_{eaten}}{15R_{total}}$
 H. 9 $\frac{18}{18} = \frac{15}{15}$
 $\frac{11 \times 15}{18 \times 6} > \frac{18n}{18 \times 6} \mid \frac{55}{6} \geq n \mid \frac{9\frac{1}{6}}{6} \geq n$

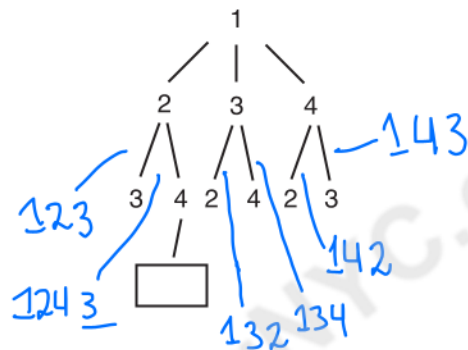
- 103.** $0^3 + 4^0 + 2^{-1} + (-1)^2$

What is the value of the expression above, in decimal form?

- A. 0 *Know your exponent rules!*
 B. 0.5 *Briefly consider:*
 C. 1.5
 D. 2.5 $b^0 = 1 \therefore 4^0 = 1$
 $0^e = 0 \therefore 0^3 = 0$
 $b^{-e} = \frac{1}{b^e} \therefore 2^{-1} = \frac{1}{2^1} = \frac{1}{2}$
 $0^3 + 4^0 + 2^{-1} + (-1)^2 =$
 $0 + 1 + \frac{1}{2} + 1 = 2.5$

- 104.** Four slips of paper numbered 1, 2, 3, and 4 were placed in a bag:

- One slip was selected from the bag, and the number recorded.
- Without replacement, a second slip was chosen. *unique digits*
- This process continued until no more slips remained in the bag.
- \therefore *incomplete*
One part of a tree diagram representing the sample space is shown.



Which number should be placed in the box to complete this part of the tree diagram?

- E. 1 *If we already selected*
 F. 2 *1, 2, and 4, and we can't*
 G. 3 *reuse a digit (that is what*
 H. 4 *"without replacement"*
tells us) then the only digit left is (3)

105. The outdoor temperature was 4.2°F at 10 p.m. After $3\frac{1}{2}$ hours, the outdoor temperature was -0.7°F . Which value best represents the average change in temperature per hour?

A. -1.4°F (10 pm + 3.5 hrs = 1:30 am)
 B. -1.0°F ?
 C. 1.0°F
 D. 1.4°F

Diagram: A number line from 10 pm to 1:30 am. At 10 pm, temperature is 4.2 . At 1:30 am, temperature is -0.7 . An arrow labeled "decreasing" points from 4.2 to -0.7 . Below the number line, calculations are shown:
 $4.2 - (-0.7) = 4.2 + 0.7 = 4.9$
 $\frac{-4.9}{3.5} = -1.4$
 Total decrease is 4.9 , so -4.9 .

106. A rectangular swimming pool of uniform depth is 20 yards long and 14 yards wide. If the water is 6 feet deep, what is the volume of water in the pool, in cubic yards?

- E. 40
- F. 286
- G. 560
- H. 1,680

Unit conversion?
 Yes!
 Solve $V = lwh$
 Don't do this:
 ~~$V = 20 \times 14 \times 6$~~
 6 feet = 2 yards
 $\therefore V = 20 \times 14 \times 2 = 560$

107. unnamed set $\{3, 4, 5, 6, 7\}$
 Set has 5 elements

A student made a list of all possible products of 2 different numbers in the set above. What fraction of the products are odd?

Total products possible:
 A. $\frac{3}{20}$ $5 \times 5 = 25$
 B. $\frac{3}{10}$ But it wants DIFFERENT products so $5 \times 4 = 20$
 C. $\frac{1}{2}$ But for every choice say
 D. $\frac{3}{5}$ 3×7 another 7×3 is possible. So $\frac{20}{2} = 10$ total possible
 $0 \times 0 = 0$ The odd #'s are 3, 5, 7
 $0 \times E = E$ So $3 \times 2 = 6$
 $E \times 0 = E$ Slot 1 slot 2 $\frac{6}{2} = 3$
 $E \times E = E$ Consider odds possible = $\frac{3}{10}$ differences

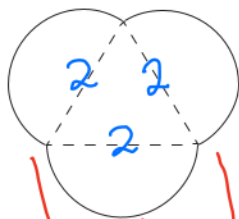
because $a \times b$ is the same as $b \times a$

108. A number, n , is divided by 25. If the quotient is 10 with a remainder of 5, what is the quotient expressed as a decimal?

E. 10.20
 F. 10.25
 G. 10.50
 H. 10.75

$\frac{n}{25} = 10 \frac{5}{25}$
 5 remainder
 divisor same # as divisor
 $10 \frac{5}{25} = 10 \frac{20}{100} = 10.20$

109.



The garden design shown above is created in the shape of three semicircles whose diameters lie on the sides of an equilateral triangle. If each diameter is 2 meters long, what is the perimeter of the garden, in meters?

- A. 6
 B. 12
 C. 3π
 D. 6π
- A circle has a perimeter, The perimeter of a circle is its circumference!
 $C = 2\pi r = D\pi = 2\pi$
 But these are semicircles. So half of each semicircle's circumference is $\frac{2\pi}{2} = \pi$
 So the circumference of these 3 semicircles is $3 \times \pi = 3\pi$

110. Micha is playing a game with five cards numbered 1 through 5. He will place the cards in a bag and draw one card at random three times, replacing the card each time. To win a prize, he must draw the number 5 all three times. What is the probability he will draw the number 5 all three times?

- E. $\frac{1}{125}$
 F. $\frac{3}{125}$
 G. $\frac{1}{15}$
 H. $\frac{3}{5}$
- To draw 5 is a probability of $\frac{1}{5}$. Since we replace each time, each draw of 5 is a probability of $\frac{1}{5}$. This means we need to solve:
 $P_5 \text{ AND } P_5 \text{ AND } P_5$
 Mathematically, "AND" maps to multiplication. So the probability asked for is:
 $\frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} = \frac{1}{125}$

111. The speed 10 meters per second is equivalent to how many feet per hour?

(Use the approximation

1 foot = 0.3 meter.)

A. 10,800

B. 12,000

C. 36,000

D. 120,000

We normally cancel values but we can also cancel units

$$\frac{10 \cancel{\text{meters}} \times \frac{60 \cancel{\text{seconds}}}{1 \cancel{\text{minute}}} \times \frac{60 \cancel{\text{minutes}}}{1 \text{hour}} \times \frac{1 \cancel{\text{foot}}}{0.3 \cancel{\text{meter}}}$$

$$= \frac{10 \times 60 \times 60 \times 1}{1 \times 1 \times 1 \times 0.3} = \frac{36000}{0.3}$$

= 120000 or use this

$$\frac{3600 \text{ seconds}}{1 \text{ hour}}$$

112.

$$6.\overline{34} - 4.\overline{12}$$

What is the value of the expression above, written as an improper fraction?

E. $\frac{24}{11}$

F. $\frac{224}{101}$

G. $\frac{111}{50}$

H. $\frac{20}{9}$

$$R = 6.\overline{34} \quad \begin{array}{r} 100R \quad 634.\overline{34} \\ - R \quad -6.\overline{34} \\ \hline 99R = 628.00 \\ \hline \frac{99R}{99} = \frac{628.00}{99} \end{array}$$

$$\frac{628}{99} = 6 \frac{34}{99}$$

$$R = 4.\overline{12} \quad \begin{array}{r} 100R \quad 412.\overline{12} \\ - R \quad -4.\overline{12} \\ \hline 99R = 408.00 \\ \hline \frac{99R}{99} = \frac{408.00}{99} \end{array}$$

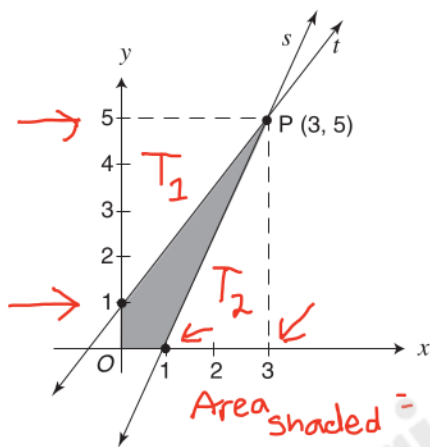
$$\frac{408}{99} = 4 \frac{12}{99}$$

$$\begin{array}{r} 6 \frac{34}{99} \\ - 4 \frac{12}{99} \\ \hline \end{array}$$

$$2 \frac{22}{99} = 2 \frac{2}{9} = \left(\frac{20}{9} \right)$$

If you know your repeating decimal rules there are many shortcuts to doing this

113.



Area shaded =
 $\text{Area}_{\text{rect}} - \text{Area}_{T_1} - \text{Area}_{T_2}$
 Lines s and t intersect at point $P(3, 5)$.
 What is the area, in square units, of the shaded region in the graph above?

- A. 2
 B. 3
 C. 4
 D. 7
- Area_{rect} = $lw = 5 \times 3 = 15$
 Area_{T₁} = $\frac{1}{2}bh = \frac{1}{2}(3)(5-1) = \frac{1}{2}(3)(4) = 6$
 Area_{T₂} = $\frac{1}{2}bh = \frac{1}{2}(3-1)(5) = \frac{1}{2}(2)(5) = 5$
 Area_{shaded} = Area_{rect} - Area_{T₁} - Area_{T₂}
 $15 - 6 - 5 = 4$

114. A box contains 14 red marbles, 10 black marbles, and 16 white marbles. How many more white marbles need to be added to the box so that the probability of randomly drawing a white marble is $\frac{3}{5}$?

- E. 8
 F. 10
 G. 14
 H. 20
- 14r
 10bl
 16wh
 40 total
- We're told
 Prob_{more white} = $\frac{3}{5}$
 Prob_{white} = $\frac{16}{40}$

If we add more white we also increase the total, If we let mw represent more white that does not yield $\frac{16+mw}{40}$ Instead it yields $\frac{16+mw}{40+mw}$ which is $\frac{3}{5}$

Do cross product:
 $5(16+mw) = 3(40+mw)$
 $80 + 5mw = 120 + 3mw$
 $-80 \quad -80$
 $5mw = 40 + 3mw$
 $-3mw \quad -3mw$
 $\frac{2mw}{2} = \frac{40}{2} = 20$

THIS IS THE END OF THE TEST.
 IF TIME REMAINS, YOU SHOULD CHECK YOUR ANSWERS. BE SURE THAT THERE ARE NO STRAY MARKS, PARTIALLY FILLED ANSWER CIRCLES, OR INCOMPLETE ERASURES ON YOUR ANSWER SHEET. ■