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January
Math Bowl - Probability, possible outcomes

1. In the Sunshine Basketball Tournament there are seven teams. If each team plays every other team twice, how many total games are played in the tournament?

	A	B	C	D	E	F	G
A	X	AB	AC	AD	AE	AF	AG
B							
C							
D							
E							
F							
G							

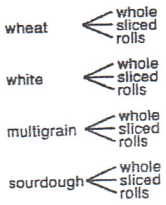
→ 6 games
× 7
42

42

Finding Possible Outcomes

Tables, tree diagrams, and multiplication can be used to list all possible outcomes.
Example: A bakery sells wheat, white, multigrain, and sourdough bread. You can buy the bread as a whole loaf, sliced loaf, or in rolls. The different choices you have are

	whole (wl)	sliced (sl)	rolls (r)
wheat (w)	wwl	wsl	wr
white (wh)	whwl	whsl	whr
multigrain(mg)	mgwl	mgsl	mgr
sourdough (s)	swl	ssl	sr



4 possible breads × 3 possible ways = 12 possible choices

Find all the possible outcomes. Use a tree diagram, table, or multiplication. Show your work.

1. A sandwich shop sells wraps and pita sandwiches. They only have tuna, egg salad, and chicken filling. How many different kinds of sandwiches do they sell?

6

2. Students at Monroe Middle School can wear khaki, forest green, or black slacks and white, forest green, or tan shirts. How many possible outfits can they wear?

9

3. Kaya sells round, square, oblong, and flat beads. They come in purple, blue, and turquoise. If she separates them by color and shape, how many different groups of beads will she have?

12

4. Suppose you are going on a trip. You decide to take 6 shirts, 2 pair of jeans, and 2 different sweaters. How many different combinations of clothing do you have if you wear 1 shirt, 1 pair of jeans, and 1 sweater?

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Independent and Dependent Events

Independent events are those when the outcome of 1 event *does not* affect the outcome of another event.
Example: The probability of (A) rolling a 5 on a 1–6 die and (B) getting a tail on a coin toss: *P* of the 2 *independent* events $= P(A) \times P(B) = \frac{1}{6} \times \frac{1}{2} = \frac{1}{12} = 0.08 = 8\%$

Dependent events are those where the outcome of 1 event *does* affect the outcome of the other event. An example is finding the probability of drawing boys' names twice in a row when the names of 6 boys and 4 girls are placed in a hat.
The probability, *P1*, of the first draw $= \frac{6}{10}$.
The probability, *P2*, of the second draw $= \frac{5}{9}$, because there are less names in the hat.
P of the 2 *dependent* events $= P(1) \times P(2) = \frac{6}{10} \times \frac{5}{9} = \frac{30}{90} = 0.33 = 33\%$

Find each probability.
Round your answer to the nearest whole percent.

1. You roll a pair of dice. Find the probability of rolling 2 sixes.
$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36} = 3\%$

2. You draw a piece of candy out of a bag containing 9 chocolate kisses and 11 fruit chews. What is the probability that you will get 2 chocolate kisses without replacing candies?
$\frac{9}{20} \times \frac{8}{19} = \frac{72}{380} = 19\%$

3. You draw letter from cards containing the letters of the word *mathematics*. You replace the card, shuffle them, and draw again. What is the probability that you draw the letter *m* twice in a row?
$\frac{2}{11} \times \frac{2}{11} = \frac{4}{121} = 3\%$

4. Using the same cards as for item 3, you draw an *m* but do not replace the card. What is the probability of drawing an *m* twice in a row?
$\frac{2}{11} \times \frac{1}{10} = \frac{2}{110} = 2\%$

5. Using the cards from item 3, find the probability of drawing 2 vowels if you replace the cards between draws.
$\frac{4}{11} \times \frac{4}{11} = \frac{16}{121} = 13\%$

6. Using the cards from item 3, you draw a consonant on the first draw but do not replace the card. Find the probability of drawing 2 consonants if you do not replace cards between draws.
$\frac{7}{11} \times \frac{6}{10} = \frac{42}{110} = \frac{21}{55} = 38\%$

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Expressing Probabilities

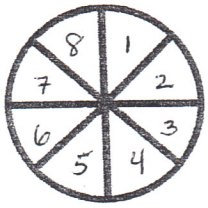
Probability is the chance that an event will occur.
The probability of an event, *P*, is equal to the ratio of the number of favorable outcomes divided by the number of possible outcomes.

Example:
There are 6 possible outcomes of rolling die: numbers 1–6.
The number of ways you could roll an even number = 3
P(3) = 3 favorable outcomes/6 possible outcomes = $\frac{3}{6} = \frac{1}{2}$
You can write the probability as a fraction, decimal, or percent.

Example: $P = \frac{1}{2} = 0.50 = 50\%$

An impossible event has a probability of 0. A certain event has a probability of 1.

Use the spinner at right. Find each probability. Express each probability as a fraction, a decimal, and a percent. Round each decimal to the nearest hundredth and each percent to the nearest one.



1. *P*(1) $\frac{1}{8}$ 0.13 13%
2. *P*(not 3) $\frac{7}{8}$ 0.88 88%
3. *P*(odd number) $\frac{1}{2}$ 0.50 50%
4. *P*(5 or 6) $\frac{1}{4}$ 0.25 25%
5. *P*(2, 5, or 7) $\frac{3}{8}$ 0.38 38%
6. *P*(>8) 0 (impossible)

The table at right shows how many T-shirts of each color Lakayla has in her drawer. Use the table to find the probability of her choosing each color shirt. Express each probability as a fraction, a decimal, and a percent.

7. Probability of her choosing a green shirt? $\frac{1}{5}$ 0.20 20%
8. Probability of her choosing a blue shirt? $\frac{1}{4}$ 0.25 25%
9. Probability of her choosing a white shirt? $\frac{2}{5}$ 0.40 40%
10. Probability of her choosing a yellow shirt? $\frac{3}{20}$ 0.15 15%

Color	Number of shirts
Green	4
Yellow	3
White	8
Blue	5
Total:	20

Find each probability. Express each probability as a fraction, a decimal, and a percent.

11. Your teacher tells you that there is a 1 in 4 chance she will have your math test ready to give back to you tomorrow. $\frac{1}{4}$ 0.25 25%
12. The probability of drawing a blue marble from a bag containing 4 blue marbles and 12 yellow ones. $\frac{1}{3}$ 0.33 33%

Student Name: _____ School Name: _____ 1/30

Event 4: Problem Solving

1) Three days ago, yesterday was the day before Friday. What day will it be the day after tomorrow?

Th F S S _ T W
↑ yest ↑ today

Wednesday

2) Jessie has 8 pairs of black socks and 3 pairs of green socks. If the socks are loose in a drawer and she is picking them at random without seeing the color at all, how many socks must she pick to be sure to get a matching pair?

3

3) 5 kids, Amy, Beth, Corey, Diego, and Emily sit in a circle in that order, counting down to one. Amy starts with 34, then Beth says, "33," and so on. Who says "one"?

A	B	C	D	E
34	33	32	31	30
29	28	27	26	25
24	23	22	21	20

Diego

4) Fill in the blanks so that the expression makes sense. Then find the sum of the digits that belong in the blanks.

$$\begin{array}{r} 4\,3\,\underline{1}\,2 \\ 4\,5\,\underline{4} \\ +\,\underline{4}\,1\,2\,7 \\ \hline 8\,8\,9\,3 \end{array}$$

9

5. Round to hundreds and then do the indicated operations.
5927+ 157 - 278

5900 +200 -300

5800

6 Evaluate, following the proper order of operations.
$4 + (5 \times 6) - (4 \div 2)$ = 4 + 30 - 2

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