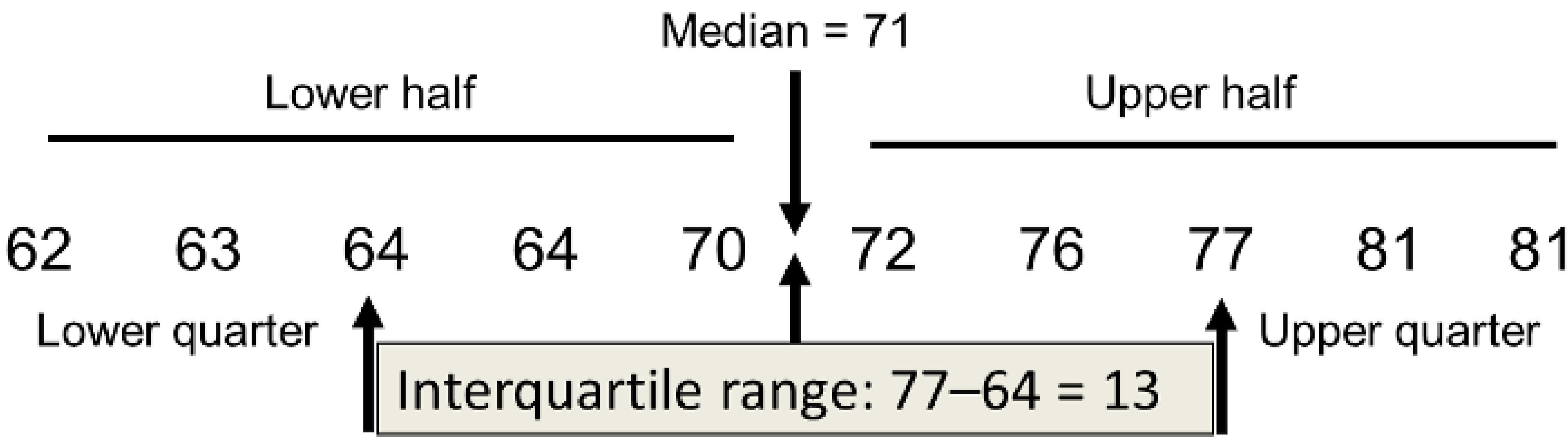
class notes



$Q_1 = 64$ $Q_3 = 77$

$$IQR = Q_3 - Q_1$$

$$IQR = 77 - 64 = 13$$

#8

A fair coin is flipped 6 times. Drag and drop each probability value next to every appropriate probability description.

H/T H/T H/T H/T H/T H/T

Number of choices

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6 = 64$

$n = 6$ ← set size

$P = \frac{1}{2}$ $\quad q = 1 - p = \frac{1}{2}$

Probability of happening

Probability of not happening

Combination

$_nC_r \, p^r q^{n-r}$

total set size

subset size

$_nC_r = \frac{n!}{r!\,(n-r)!}$

$0! = 1 \qquad x^0 = 1$

$5! = 5 \times 4 \times 3 \times 2 \times 1$

Frequency (r)	0	1	2	3	4	5	6
Probability (p)	$_6C_0$	$_6C_1$	$_6C_2$	$_6C_3$	$_6C_4$	$_6C_5$	$_6C_6$
					15	6	1

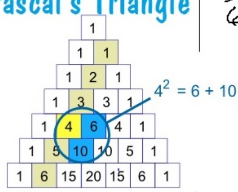
$\frac{6!}{0!\,(6-0)!} = \frac{\cancel{6!}}{1 \cdot \cancel{6!}} = \frac{1}{64}$

$\frac{6!}{1!\,(6-1)!} = \frac{6!}{5!} = \frac{6 \cdot \cancel{5!}}{\cancel{5!}} = 6 \quad \frac{6}{64}$

$\frac{6!}{2!\,(6-2)!} = \frac{6!}{2!\,4!} = \frac{6 \cdot 5 \cdot \cancel{4!}}{2 \cdot \cancel{4!}} = \frac{30}{2} = 15 \quad \frac{15}{64}$

$\frac{6!}{3!\,(6-3)!} = \frac{6!}{3!\,3!} = \frac{6 \cdot 5 \cdot 4 \cdot \cancel{3!}}{3 \cdot 2 \cdot 1 \cdot \cancel{3!}} = \frac{120}{6} = 20 \quad \frac{20}{64}$

Pascal's Triangle



Frequency (r)	0	1	2	3	4	5	6
Probability (p)	1/64	$\frac{6}{64}$	$\frac{15}{64}$	$\frac{20}{64}$	$\frac{15}{64}$	$\frac{6}{64}$	$\frac{1}{64}$

A. The probability of getting at least 4 heads.

$$P(X \geq 4) = P(X=4) + P(X=5) + P(X=6) = \frac{15}{64} + \frac{6}{64} + \frac{1}{64} = \frac{22}{64} = \frac{11}{32}$$

B. The probability of getting no more than 4 heads.

$$P(X \leq 4) = P(X=0) + P(X=1) + P(X=2) + P(X=3) + P(X=4)$$
$$= \frac{1}{64} + \frac{6}{64} + \frac{15}{64} + \frac{20}{64} + \frac{15}{64} = \frac{57}{64}$$

C. The probability of getting 5 or 3 heads.

$$P(X=5) + P(X=3) = \frac{6}{64} + \frac{20}{64} = \frac{26}{64} = \frac{13}{32}$$

D. The probability of getting no more than 2 heads.

$$P(X \leq 2) = P(X=0) + P(X=1) + P(X=2) = \frac{1}{64} + \frac{6}{64} + \frac{15}{64} = \frac{22}{64} = \frac{11}{32}$$

E. The probability of getting an even number of heads

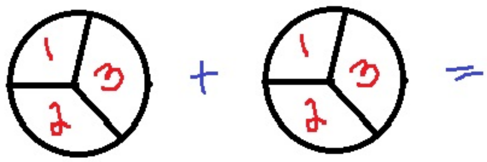
$$P(X=0) + P(X=2) + P(X=4) + P(X=6) = \frac{1}{64} + \frac{15}{64} + \frac{15}{64} + \frac{1}{64} = \frac{32}{64} = \frac{1}{2}$$

F. The probability of getting an odd number of heads.

$$P(X=1) + P(X=3) + P(X=5) = \frac{6}{64} + \frac{20}{64} + \frac{6}{64} = \frac{32}{64} = \frac{1}{2}$$

#11

A spinner has three equal sections, labeled 1, 2, and 3. You spin the spinner twice and find the sum of the two numbers the spinner lands on.



	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6

$3 \cdot 3 = 9$

Part 1 out of 4

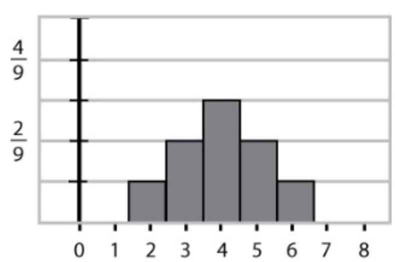
a. Let X be a random variable that represents the sum of the two numbers. What are the possible values of X?

The possible values of X are 2, 3, 4, 5, and 6.

Part 2 out of 4

b. Complete the table. Enter your answers in the form of fractions.

Sum	2	3	4	5	6
Probability	$\frac{1}{9}$	$\frac{2}{9}$	$\frac{3}{9}$	$\frac{2}{9}$	$\frac{1}{9}$



Part 4 out of 4

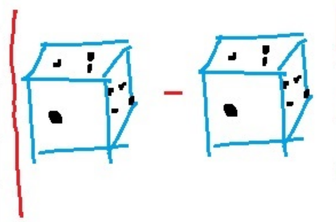
d. What is the probability that the sum is not 4? How is this probability represented in the histogram? Enter the probability in the form of a fraction.

$\frac{1}{9} + \frac{2}{9} + \frac{2}{9} + \frac{1}{9} = \frac{6}{9}$

The probability is $\frac{2}{3}$. This is the sum of the areas of the bars for the outcomes 2, 3, 5, and 6.

#12

	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0



The possible values of X are 0, 1, 2, 3, 4, and 5.

Part 2 out of 5

b. Complete the table. Enter your answers in the form of fractions.

Absolute Difference	0	1	2	3	4	5
Probability	$\frac{6}{36}$	$\cancel{\frac{10}{36}}$ $\frac{5}{18}$	$\cancel{\frac{8}{36}}$ $\frac{2}{9}$	$\frac{6}{36}$	$\frac{4}{36}$	$\frac{2}{36}$

Part 3 ✓

c. Is this probability distribution symmetric?

A Yes

B No

Right Skewed

Part 4 ✓

Why is this probability distribution asymmetric?

The probability distribution is skewed right because in a histogram of the distribution, the tallest bar would occur at 1, with bars to the right decreasing in height.

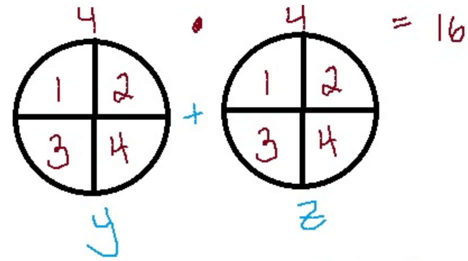
Part 5 ✓

Find the probability of getting a difference greater than 1.

The probability of getting a difference greater than 1 is $\frac{5}{9}$.

Probability

A spinner has 4 equal sections that are labeled 1, 2, 3, and 4. You spin the spinner twice and find the sum of the 2 numbers it lands on. Let X be a random variable that represents the sum of the 2 numbers.



$X = y + z$

Part 1 out of 4 Complete the table.

Sum	2	3	4	5	6	7	8
Frequency	1	2	3	4	3	2	1
Probability	$\frac{1}{16}$	$\frac{2}{16}$	$\frac{3}{16}$	$\frac{4}{16}$	$\frac{3}{16}$	$\frac{2}{16}$	$\frac{1}{16}$

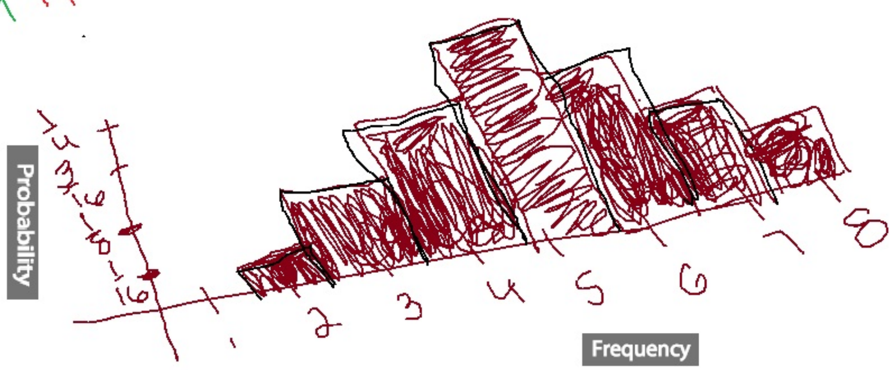
Frequency: $\frac{1}{16}$ $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{1}{8}$

$1+1=2$ $1+2=3$ $1+3=4$ $1+4=5$

$2+1=3$ $2+2=4$ $2+3=5$ $2+4=6$

$3+1=4$ $3+2=5$ $3+3=6$ $3+4=7$

$4+1=5$ $4+2=6$ $4+3=7$ $4+4=8$



Part 3 out of 4
What is the probability of getting a sum of 4 or more?

4 5 6 7 8

$P(X \geq 4)$ $\frac{3}{16} + \frac{4}{16} + \frac{3}{16} + \frac{2}{16} + \frac{1}{16} = \frac{13}{16} \approx 0.8125 \approx 0.813$

$P(X > 5)$ = $P(X < 5)$ because the histogram of the probability distribution

6, 7, 8 = 4, 3, 2

$\frac{3}{16} + \frac{2}{16} + \frac{1}{14} = \frac{3}{16} + \frac{2}{16} + \frac{1}{16}$

$\frac{6}{16} = \frac{6}{16}$