Binomial or normal?

Probability distributions. Use your calculator's distribution functions. Give probabilities to 3 significant figures.

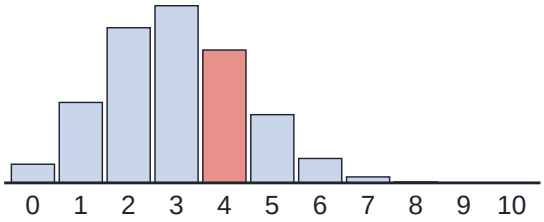
Name _____

Date _____

Part A: one of each

Each question tells you which distribution to use.

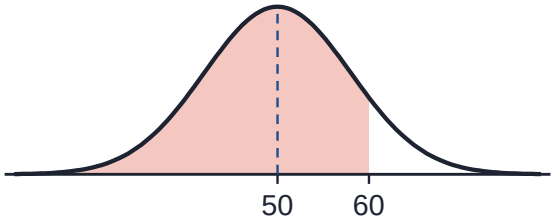
1 **BINOMIAL**



$X \sim B(10,\ 0.3)$. Find $P(X = 4)$.

Answer: _____

2 **NORMAL**



$X \sim N(50,\ 8^2)$. Find $P(X < 60)$.

Answer: _____

Part B: you decide

Binomial $X \sim B(n, p)$
A fixed number of trials n, each a success or a failure, with the same probability p. X counts the successes, so it takes whole-number values.

Normal $X \sim N(\mu, \sigma^2)$
A continuous measurement, such as a length, mass or time, with a given mean and standard deviation.

For each question, decide which distribution fits, then find the probability. Each answer matches a letter in the code table. The letters from questions 1 to 8, in order, spell a word.

1

A fair dice is rolled 12 times. Find the probability of exactly 3 sixes.

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ____

2

Heights of adults in a town are normally distributed with mean 170 cm and standard deviation 6 cm. Find the probability that an adult is taller than 180 cm.

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ____

3

85% of a type of seed germinate. 20 seeds are planted. Find the probability that at least 18 germinate.

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ___

4

The mass of a bag of flour is normally distributed with mean 500 g and standard deviation 4 g. Find the probability that a bag weighs between 494 g and 506 g.

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ___

5

A quiz has 15 questions, each with 4 options. Ali guesses every answer. Find the probability that he gets at most 2 right.

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ___

6

The time to finish a puzzle is normally distributed with mean 42 minutes and standard deviation 5.5 minutes. Find the probability that a person takes less than 35 minutes.

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ___

7

8% of the batteries from a factory are faulty. A box holds 25 batteries. Find the probability that more than 3 are faulty.

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ___

8

The number of hours a bulb lasts is normally distributed with mean 1200 and standard deviation 150. Find the probability that a bulb lasts more than 1000 hours. (Is this a count?)

Which method? ☐ Binomial ☐ Normal

Answer: _____ Letter: ___

0.0478	0.0802	0.0912	0.102	0.135	0.176	0.197	0.236
A	**C**	**O**	**I**	**N**	**J**	**S**	**L**
0.323	0.405	0.866	0.875	0.898	0.909	0.933	0.952
D	**M**	**P**	**R**	**U**	**G**	**X**	**K**

1 2 3 4 5 6 7 8

Answers

Part A

1. $P(X = 4) = \binom{10}{4}(0.3)^4(0.7)^6 = 0.200$

2. $P(X < 60) = 0.894$ (normal cdf, lower bound $-\infty$, upper 60, $\mu = 50$, $\sigma = 8$)

Part B

1. Binomial. $X \sim B(12, \frac{1}{6})$. $P(X = 3) = 0.197$ → **S**

2. Normal. $H \sim N(170, 6^2)$. $P(H > 180) = 0.0478$ → **A**

3. Binomial. $X \sim B(20, 0.85)$. $P(X \geq 18) = 1 - P(X \leq 17) = 0.405$ → **M**

4. Normal. $M \sim N(500, 4^2)$. $P(494 < M < 506) = 0.866$ → **P**

5. Binomial. $X \sim B(15, 0.25)$. $P(X \leq 2) = 0.236$ → **L**

6. Normal. $T \sim N(42, 5.5^2)$. $P(T < 35) = 0.102$ → **I**

7. Binomial. $X \sim B(25, 0.08)$. $P(X > 3) = 1 - P(X \leq 3) = 0.135$ → **N**

8. Normal. A length of time, so normal, even though it is measured in hours. $L \sim N(1200, 150^2)$. $P(L > 1000) = 0.909$ → **G**

The word is **SAMPLING**. Most of the other letters come from the inequality slips that cost marks: $P(X \leq 3)$ instead of $P(X = 3)$, $P(X > 18)$ instead of $P(X \geq 18)$, or the wrong tail of a normal curve.