Name _____ Date _____

13.2 Calculating probabilities — worksheet

Calculate the probability of an event with equally likely outcomes, and use the fact that an event and its complement total 1. · 50 questions · Show your working.

Remember

- When outcomes are **equally likely**: **P = favourable outcomes ÷ total outcomes**.
- Count the total carefully — it is the denominator of every answer in the question.
- The probabilities of all possible outcomes **add to 1**, because something must happen.
- So **P(not A) = 1 − P(A)**. This is often much quicker than counting.
- Two events are **mutually exclusive** if they cannot both happen.
- For mutually exclusive events, **P(A or B) = P(A) + P(B)** — no outcome gets counted twice.
- Give the answer as a fraction in its simplest form unless the question says otherwise.
- The formula only applies when the outcomes really are equally likely: a drawing pin is not a fair coin.

A · Fluency — Count, divide and simplify.

1 An ordinary six-sided dice is rolled. What is the probability of **an even number**?

2 An ordinary six-sided dice is rolled. What is the probability of **a 6**?

3 An ordinary six-sided dice is rolled. What is the probability of **a number less than 3**?

4 An ordinary six-sided dice is rolled. What is the probability of **a number greater than 4**?

5 An ordinary six-sided dice is rolled. What is the probability of **an odd number**?

6 An ordinary six-sided dice is rolled. What is the probability of **a number more than 6**?

7 An ordinary six-sided dice is rolled. What is the probability of **a number less than 7**?

8 An ordinary six-sided dice is rolled. What is the probability of **a prime number**?

9 An ordinary six-sided dice is rolled. What is the probability of **a multiple of 3**?

10 An ordinary six-sided dice is rolled. What is the probability of **a 1 or a 2**?

11 A bag holds 5 counters, of which 3 are red. One is taken at random. What is the probability it is red?

12 A bag holds 5 counters, of which 3 are red. What is the probability of **not** red?

13 A bag holds 6 counters, of which 4 are blue. One is taken at random. What is the probability it is blue?

14 A bag holds 6 counters, of which 4 are blue. What is the probability of **not** blue?

15 A bag holds 8 counters, of which 2 are green. One is taken at random. What is the probability it is green?

16 A bag holds 8 counters, of which 2 are green. What is the probability of **not** green?

17 A bag holds 10 counters, of which 7 are yellow. One is taken at random. What is the probability it is yellow?

18 A bag holds 10 counters, of which 7 are yellow. What is the probability of **not** yellow?

19 A bag holds 12 counters, of which 5 are black. One is taken at random. What is the probability it is black?

20 A bag holds 12 counters, of which 5 are black. What is the probability of **not** black?

21 A bag holds 9 counters, of which 6 are white. One is taken at random. What is the probability it is white?

22 A bag holds 9 counters, of which 6 are white. What is the probability of **not** white?

23 The probability of an event is ¹$_{2}$. What is the probability it does **not** happen? Give it as a decimal.

24 The probability of an event is ¹$_{4}$. What is the probability it does **not** happen? Give it as a decimal.

25 The probability of an event is ³$_{10}$. What is the probability it does **not** happen? Give it as a decimal.

26 The probability of an event is ²$_{5}$. What is the probability it does **not** happen? Give it as a decimal.

27 The probability of an event is ⁷$_{20}$. What is the probability it does **not** happen? Give it as a decimal.

28 The probability of an event is ⁹$_{25}$. What is the probability it does **not** happen? Give it as a decimal.

B · Reasoning — The formula, and when it applies.

29 How do you calculate a probability when outcomes are equally likely?
- ☐ Guess
- ☐ Favourable outcomes ÷ total outcomes
- ☐ Total outcomes ÷ favourable outcomes
- ☐ Add the outcomes

30 What does “equally likely” mean?
- ☐ There are many outcomes
- ☐ Each outcome has the same chance
- ☐ The outcomes are numbers
- ☐ Nothing

31 Why must you count the total outcomes carefully?
- ☐ It looks neat
- ☐ It is the denominator, so an error changes every answer
- ☐ It is not important
- ☐ To find the mean

32 The probabilities of all possible outcomes add to …
- ☐ 0
- ☐ 1/2
- ☐ 1
- ☐ 100

33 If P(event) = 2/7, what is P(not event)?
- ☐ 2/7
- ☐ 5/7
- ☐ 7/2
- ☐ 1/7

34 Is a drawing pin equally likely to land point-up or point-down?
- ☐ Yes
- ☐ No

35 Two events are **mutually exclusive** when …
- ☐ they are equally likely
- ☐ they cannot both happen
- ☐ they always happen
- ☐ they have the same probability

36 For two mutually exclusive events, P(A or B) is …
- ☐ P(A) × P(B)
- ☐ P(A) + P(B)
- ☐ P(A) − P(B)
- ☐ 1

C · Challenge — Combined events and working backwards.

37 A bag holds 4 red, 5 blue and 3 green counters. What is the probability of red or green?

38 A bag holds 4 red, 5 blue and 3 green counters. What is the probability of not blue?

39 A bag has 20 counters and P(red) = 1/4. How many are red?

40 A bag has red and blue counters only. P(red) = 3/8 and there are 24 counters. How many are blue?

41 A fair dice is rolled. What is the probability of a prime number or a 6?

42 A spinner has 5 equal sectors numbered 1 to 5. It is spun 60 times. About how many times would you expect a 3?

D · Word problems — Bags, cards, classes and spinners.

43 A class of 30 has 18 girls. One learner is chosen at random. What is the probability of a girl?

44 A pack of 52 cards has 13 hearts. What is the probability of drawing a heart?

45 A raffle sells 200 tickets and you buy 5. What is the probability you win?

46 A box has 15 pens, 6 of them broken. What is the probability of picking a working one?

47 A bag has 24 sweets and P(red) = 1/3. How many are red?

48 A spinner has 8 equal sectors, 3 of them blue. Out of 40 spins, about how many would be blue?

49 A month is chosen at random. What is the probability it starts with J?

50 A letter is chosen at random from MATHEMATICS. What is the probability it is an M?