

Name _____

Date _____

13.1 The probability scale — worked answers

Use the language of probability and place events on the 0-to-1 scale, in words, fractions, decimals and percentages. · 47 questions

A · Fluency — Describe, and convert between forms.

1 How likely is it that **the sun will rise tomorrow**?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: certain

This is **certain** — it must happen.

2 How likely is it that **you will roll a 7 on an ordinary dice**?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: impossible

This is **impossible** — it can never happen.

3 How likely is it that **a fair coin lands on heads**?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: even chance

This is **even chance** — it is just as likely to happen as not.

4 How likely is it that **it will snow in the Sahara tomorrow**?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: unlikely

This is **unlikely** — it will probably not happen, but it could.

5 How likely is it that **a baby born today is a boy?**

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: even chance

This is **even chance** — it is just as likely to happen as not.

6 How likely is it that **a randomly chosen day of the week is a weekday?**

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: likely

This is **likely** — it will probably happen, but it might not.

7 How likely is it that **you will live to be 500 years old?**

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: impossible

This is **impossible** — it can never happen.

8 How likely is it that **a randomly chosen month has 30 or 31 days?**

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: likely

This is **likely** — it will probably happen, but it might not.

9 How likely is it that **a dice lands on an even number?**

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: even chance

This is **even chance** — it is just as likely to happen as not.

10 How likely is it that **a randomly chosen letter of the alphabet is a vowel**?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: unlikely

This is **unlikely** — it will probably not happen, but it could.

11 How likely is it that **water boils when heated enough**?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: certain

This is **certain** — it must happen.

12 How likely is it that **a randomly chosen card from a pack is a heart**?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ likely
- ☐ certain

Answer: unlikely

This is **unlikely** — it will probably not happen, but it could.

13 A probability is $\frac{1}{2}$. What is it as a decimal, to 2 decimal places?

Answer: 0.5

$1 \div 2 = 0.5000\dots$, which is 0.5 to 2 d.p.

14 A probability is $\frac{1}{4}$. What is it as a decimal, to 2 decimal places?

Answer: 0.25

$1 \div 4 = 0.2500\dots$, which is 0.25 to 2 d.p.

15 A probability is $\frac{3}{4}$. What is it as a decimal, to 2 decimal places?

Answer: 0.75

$3 \div 4 = 0.7500\dots$, which is 0.75 to 2 d.p.

16 A probability is $\frac{1}{6}$. What is it as a decimal, to 2 decimal places?

Answer: 0.17

$1 \div 6 = 0.1667\dots$, which is 0.17 to 2 d.p.

17 A probability is $\frac{5}{6}$. What is it as a decimal, to 2 decimal places?

Answer: 0.83

$5 \div 6 = 0.8333\dots$, which is 0.83 to 2 d.p.

18 A probability is $\frac{1}{3}$. What is it as a decimal, to 2 decimal places?

Answer: 0.33

$1 \div 3 = 0.3333\dots$, which is 0.33 to 2 d.p.

- 19** A probability is $\frac{2}{3}$. What is it as a decimal, to 2 decimal places?
Answer: 0.67
 $2 \div 3 = 0.6667\dots$, which is 0.67 to 2 d.p.
- 20** A probability is $\frac{1}{5}$. What is it as a decimal, to 2 decimal places?
Answer: 0.2
 $1 \div 5 = 0.2000\dots$, which is 0.2 to 2 d.p.
- 21** A probability is $\frac{7}{10}$. What is it as a decimal, to 2 decimal places?
Answer: 0.7
 $7 \div 10 = 0.7000\dots$, which is 0.7 to 2 d.p.
- 22** A probability is $\frac{1}{10}$. What is it as a decimal, to 2 decimal places?
Answer: 0.1
 $1 \div 10 = 0.1000\dots$, which is 0.1 to 2 d.p.
- 23** A probability is 50%. Write it as a fraction in its simplest form.
Answer: $\frac{1}{2}$
50% means 50 out of 100, which simplifies to $\frac{1}{2}$.
- 24** A probability is 25%. Write it as a fraction in its simplest form.
Answer: $\frac{1}{4}$
25% means 25 out of 100, which simplifies to $\frac{1}{4}$.
- 25** A probability is 75%. Write it as a fraction in its simplest form.
Answer: $\frac{3}{4}$
75% means 75 out of 100, which simplifies to $\frac{3}{4}$.
- 26** A probability is 20%. Write it as a fraction in its simplest form.
Answer: $\frac{1}{5}$
20% means 20 out of 100, which simplifies to $\frac{1}{5}$.
- 27** A probability is 10%. Write it as a fraction in its simplest form.
Answer: $\frac{1}{10}$
10% means 10 out of 100, which simplifies to $\frac{1}{10}$.
- 28** A probability is 80%. Write it as a fraction in its simplest form.
Answer: $\frac{4}{5}$
80% means 80 out of 100, which simplifies to $\frac{4}{5}$.

B · Reasoning — The limits of the scale, and why numbers beat words.

- 29** What is the smallest a probability can be?
- ☐ -1
 - ☐ 0
 - ☐ 1
 - ☐ There is no smallest
- Answer: 0**
0 means impossible. A probability can never be negative.

30 What is the largest a probability can be?

- ☐ 1
- ☐ 10
- ☐ 100
- ☐ There is no largest

Answer: 1

1 means certain. A probability can never be more than 1.

31 What does a probability of 0.5 mean?

- ☐ It will definitely happen
- ☐ It is just as likely to happen as not
- ☐ It will not happen
- ☐ It happens half the time exactly

Answer: It is just as likely to happen as not

It does not promise that half of any particular set of trials will succeed.

32 Which is the most likely: a probability of 0.2, $\frac{1}{5}$ or 20%?

- ☐ 0.2
- ☐ $\frac{1}{5}$
- ☐ 20%
- ☐ They are all the same

Answer: They are all the same

$0.2 = \frac{1}{5} = 20\%$. Convert before comparing.

33 Can a probability be 1.5?

- ☐ Yes
- ☐ No

Answer: No

Nothing can be more than certain.

34 Can a probability be written as a percentage?

- ☐ Yes
- ☐ No

Answer: Yes

0, $\frac{1}{2}$ and 1 are the same as 0%, 50% and 100%.

35 An event has probability 0.9. How would you describe it?

- ☐ impossible
- ☐ unlikely
- ☐ even chance
- ☐ very likely

Answer: very likely

It is close to 1, but not certain.

36 Why is “it will probably rain” not precise enough in maths?

- ☐ It is too long
- ☐ Different people mean different things by “probably”
- ☐ Rain cannot be measured
- ☐ It is precise enough

Answer: Different people mean different things by “probably”

A number on the 0-to-1 scale says exactly how likely.

C · Challenge — Ordering across different forms.

- 37** An event has probability $\frac{3}{8}$. What is that as a percentage?

Answer: 37.5

$$3 \div 8 = 0.375 = 37.5\%.$$

- 38** An event has probability 0.35. What is that as a percentage?

Answer: 35

$$0.35 \times 100 = 35\%.$$

- 39** An event has probability 65%. Write it as a fraction in its simplest form.

Answer: 13/20

$$65/100 = 13/20.$$

- 40** Put these in order, most likely first: 0.4, $\frac{1}{3}$, 45%.

☐ 0.4, $\frac{1}{3}$, 45%

☐ 45%, 0.4, $\frac{1}{3}$

☐ $\frac{1}{3}$, 0.4, 45%

☐ 45%, $\frac{1}{3}$, 0.4

Answer: 45%, 0.4, $\frac{1}{3}$

As percentages: 40%, 33.3%, 45%. So 45% is largest and $\frac{1}{3}$ smallest.

- 41** An event and its opposite have probabilities that add to 1. One is 0.3. What is the other?

Answer: 0.7

$$1 - 0.3 = 0.7.$$

D · Word problems — Coins, bags, forecasts and games.

- 42** A bag holds only red counters. How likely is drawing a red one?

☐ impossible

☐ unlikely

☐ even chance

☐ certain

Answer: certain

Every counter is red.

- 43** A bag holds only red counters. How likely is drawing a blue one?

☐ impossible

☐ unlikely

☐ even chance

☐ certain

Answer: impossible

There are no blue counters.

- 44** A fair coin is tossed. How likely is a tail?

☐ impossible

☐ unlikely

☐ even chance

☐ certain

Answer: even chance

Two equally likely outcomes.

- 45** A weather forecast says 70% chance of rain. What is the chance of no rain, as a percentage?

Answer: 30

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

- 46** A game says you win 1 time in 4. What is that as a percentage?

Answer: 25

$$1/4 = 25\%.$$

- 47** A test has a 0.8 pass rate. What percentage fail?

Answer: 20

$$1 - 0.8 = 0.2 = 20\%.$$