Name:

Exam Style Questions

# Probability

**Corbettmaths**

Equipment needed: Pen and Calculator

**Guidance**

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

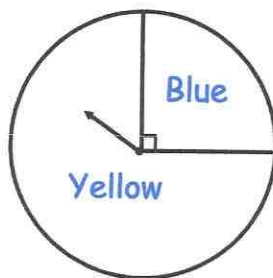Video Tutorial

www.corbettmaths.com/contents

Videos 244, 245, 250, 251
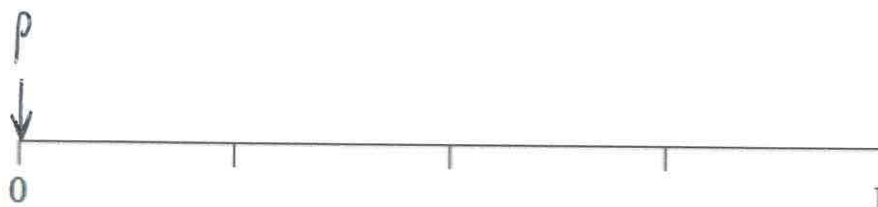
Answers and Video Solutions

1.  The diagram shows a fair spinner.



(a) Which colour is the arrow most likely to land on?

Yellow

(1)

(b) Mark the scale with an arrow to show the probability of landing on green.



(1)

2.

Impossible   Unlikely   Even   Likely   Certain

Which word from the box best describes the likelihood of each of these events?

(a) A new-born baby is a girl.

Even

(1)

(b) You thrown an ordinary dice and get a two.

Unlikely

(1)

**3.**

| Impossible   Unlikely   Evens   Likely   Certain |
| --- |

Use a word from the box which best describes the probability of each of the following events

(a) You roll a 10 on an ordinary six sided dice.

*Impossible*

(1)

(b) You roll a number greater than 1 on an ordinary six sided dice.

*likely*

(1)

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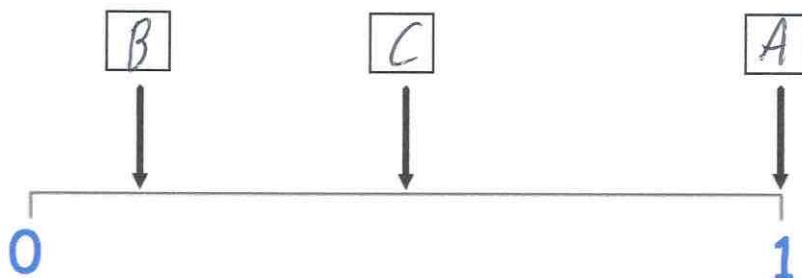
**4.** A fair six-sided dice is thrown.

The probabilities of the following events have been marked on the probability scale below.

**A:** A number less than 7 is thrown.
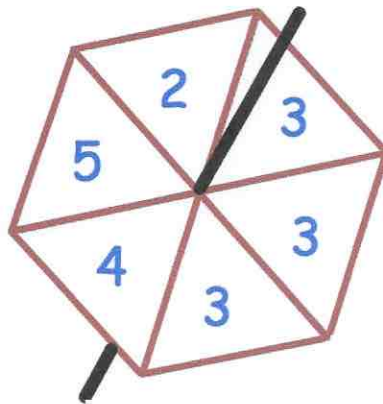
**B:** A "6" is thrown.

**C:** An odd number is thrown.

| B | | C | | | A |
| --- | --- | --- | --- | --- | --- |

↓      ↓            ↓

**0**                               **1**

Place the events A, B and C in the correct boxes.

(3)

5.     Amir makes a fair spinner with six sectors.



Impossible  Unlikely  Evens  Likely  Certain

Use a word from the box which best describes the probability of each of the following events

(a) The spinner will land on 6

*Impossible*
(1)

(b) The spinner will land on 3

*Evens*
(1)

(c) The spinner will land on 2
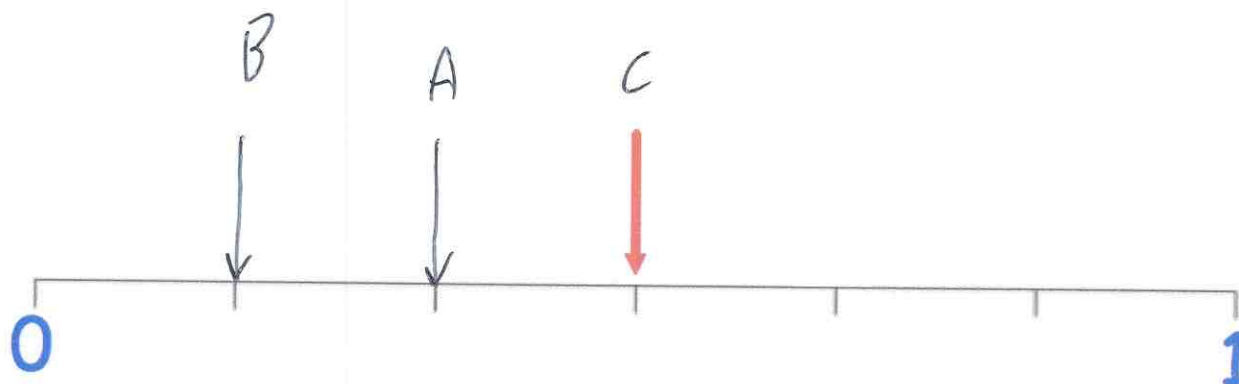
*Unlikely*
(1)

(d) The spinner will land on a number greater than 1

*Certain*
(1)

6. A fair six sided dice is rolled.
The probability of one of the following events is marked with an arrow on the scale below.

**A**     The dice lands showing a number less than three.
**B**     The dice lands showing the number three.
**C**     The dice lands showing an even number

*B*       *A*       *C*

0                     1

(a) Label the arrow to show which event it represents.

(1)

(b) Mark and label the scale to show the probabilities of the other two events.

(2)

7. The following cards are placed in a box.

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

A card is selected at random.

Find the probability that the number on the card is
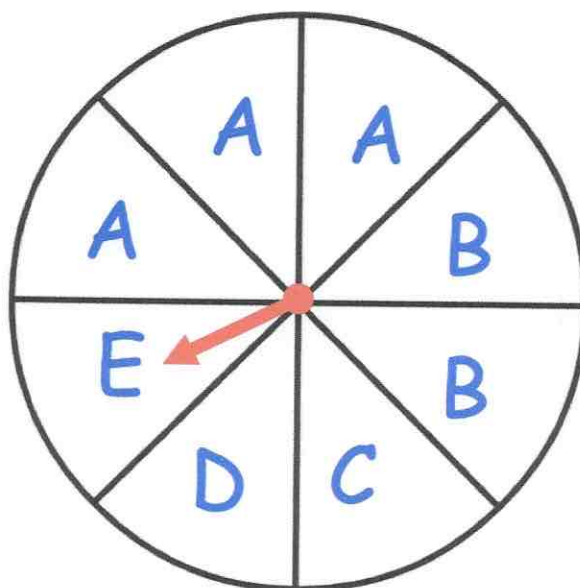
(a) 3

$\frac{1}{6}$

(1)

(b) an odd number

$\frac{3}{6}$        $\frac{1}{2}$

(1)

8.    A fair spinner has eight equal sections.
      The sections are labelled A, B, C, D and E as shown below.



The arrow is spun.

(a) Which is the most likely letter that the arrow will land on?

_____A_____
(1)

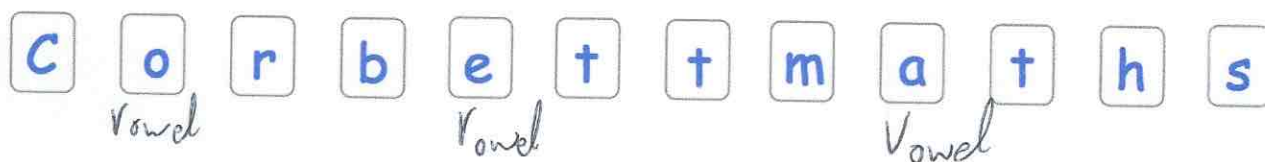(b) What is the probability that the arrow lands on a B?

$\frac{2}{8}$           $\frac{1}{4}$
_____
(1)

(c) What is the probability that the arrow lands on an A?

$\frac{3}{8}$
_____
(1)

9.   Thomas has 12 cards, each with a letter on it.

C o r b e t t m a t h s

*Vowel* (under o), *Vowel* (under e), *Vowel* (under a)

He picks a card at random.

Write down the probability that the chosen card is

(a)  the letter h

$\frac{1}{12}$

(1)

(b)  the letter t

$\frac{3}{12} = \frac{1}{4}$

(1)

(c)  **not** the letter e

$\frac{11}{12}$

(2)

(d)  the letter b **or** the letter t

$\frac{1}{}$   $\frac{3}{}$

$\frac{4}{12} = \frac{1}{3}$

(2)

(e)  a vowel    a e i o u

$\frac{3}{12} = \frac{1}{4}$

(2)

10. A bag contains 10 discs.
Each disc is labelled with a different number from 1 to 10.
A disc is chosen from the bag at random.

Write down the probability that the chosen disc is

(a) the number 3

$\frac{1}{10}$

**(1)**

(b) a number less than four

$\frac{3}{10}$

**(2)**

(c) a square number

1    4    9

$\frac{3}{10}$

**(2)**

(d) a prime number    2  3  5  7

$\frac{4}{10} = \frac{2}{5}$

**(2)**

---

11. Liam rolls an ordinary fair six sided dice.
Write down the probability that he gets

(a) the number 4

$\frac{1}{6}$

**(1)**

(b) a number less than 5

$\frac{4}{6} = \frac{2}{3}$

**(2)**

12.  Catriona has 10 yellow counters, 5 orange counters and 4 white counters.

One counter is chosen at random.

Write down the probability that the counter is orange.

$10 + 5 + 4 = 19$

$\dfrac{5}{19}$

.................................

(2)

---

13.  There are 12 chairs in a room.
5 of the chairs are brown.

A chair is chosen at random from the room.

(a) Write down the probability that the chair is brown.

$\dfrac{5}{12}$

.................................

(1)

There are only red and green pens in a box.

A pen is chosen at random from the box.
The probability that the pen is green is 0.6

(b) Find the probability that the pen is red.

$1 - 0.6 = 0.4$

$0.4$

.................................

(1)

14. There are 50 sweets in a bag.

13 of the sweets are lemon flavoured.
The rest of the sweets are strawberry flavoured.

One sweet is taken at random from the bag.

Find the probability that the sweet is strawberry flavoured.

$$50 - 13 = 37 \text{ (strawberry sweets)}$$

$$\frac{37}{50}$$

......................

(2)

15. A teacher surveyed the 30 students in their class about they travelled to school.

5 students walked to school.
8 students cycled to school.
6 students travelled to school by bus.
The rest of the students in the class travelled to school by car.

A student is picked at random from the class.

Find the probability that the student travelled to school by bus or by car.

$$5 + 8 + 6 = 19$$

$$30 - 19 = 11 \text{ (car)}$$

$$6 + 11 = 17$$

$$\frac{17}{30}$$

......................

(3)

16. Sean has a box of pens.
The box contains 6 blue pens, 8 black pens and 3 red pens.

(a) What is the probability that he will pick a blue pen?

$6 + 8 + 3 = 17$

$\frac{6}{17}$

(1)

(b) What is the probability that he will pick a green pen?

$0$

(1)

Some more blue pens are added to the box.
The probability of selecting a blue pen is now $\frac{1}{2}$

(c) How many blue pens were added to the box?

$8 + 3 = 11$ black & red pens

11 blue needed.

$6 + \boxed{5} = 11$

$5$

(2)

17. (a) List the prime numbers that are less than 20

$2 \quad 3 \quad 5 \quad 7 \quad 11 \quad 13 \quad 17 \quad 19$

(2)

A prime number less than 20 is picked at random.

(b) Write down the probability that the prime number is even.

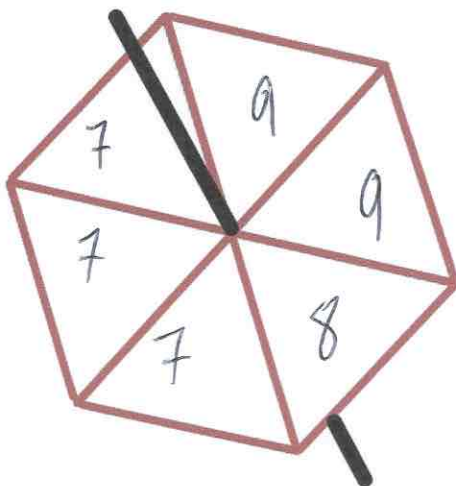$\frac{1}{8}$

(1)

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18. Tony makes a fair six-sided spinner.
The spinner has the numbers 7, 8 and 9 on it.

The probability the spinner will land on 7 is greater than the probability that the spinner will land on 8.

The probability that the spinner will land on 9 is $\frac{1}{3}$

Write the numbers on the spinner.

$\frac{1}{3}$ of 6 = 2



(2)

19. The table below shows the number of coins in a bag.

| Coin | Number in Bag |
|------|---------------|
| 1p | 24 |
| ✳ 2p | 18 |
| 5p | 14 |
| 10p | 12 |

Alecia takes a coin at random from the bag.

Write down the probability that it is a 2p coin.

$24 + 18 + 14 + 12 = 68$

$\frac{18}{68} = \frac{9}{34}$

$\frac{9}{34}$

(2)

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20. Elizabeth has a bunch of red, yellow and white roses.
    She chooses a rose at random.

    The probability that she chooses a yellow rose is 0.1
    The probability that she chooses a white rose is 0.2

    (a) What is the probability that Elizabeth chooses a rose that is either yellow or white?

    $$0.1 + 0.2 = 0.3$$

    _0.3_
    **(1)**

    (b) What is the probability that Elizabeth chooses a red rose?

    $$1 - 0.3 = 0.7$$

    _0.7_
    **(2)**

    (c) There were ten roses in the bunch originally.
    How many roses were red?

    $$10 \times 0.7 = 7$$

    _7_
    **(2)**

21. As part of a game, Walter is going to pick a card at random from a deck.

If Walter picks a card with a star on it, he will win the game.
If Walter does not pick a card with a star on it, he will not win the game.

8 cards have a star on it and the rest do not.
There are a total of 60 cards.

Find the probability that Walter does **not** win the game.

$$60 - 8 = 52$$

$$\frac{52}{60} = \frac{13}{15}$$

$\frac{13}{15}$

.......................

(2)

22. Mia has five numbered cards.



One of these cards is chosen at random.
Mia says:

The probability of an odd number is $\frac{3}{5}$   3 odd

The probability of a 7 is $\frac{2}{5}$   2 cards have the number 7 on it.

The range of the numbers is 10
The probability of a 2 is 0.

Fill in three numbers that could be on Mia's cards.

4, 7, 14

.....2..........7...14...

(3)

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23. Counters labelled A, B, C, D and E are placed in a bag.
The table shows the probabilities of picking each letter at random.

| Letter | A | B | C | D | E |
|---|---|---|---|---|---|
| Probability | 0.07 | 0.15 | 0.26 | 0.34 | 0.18 |

(a) Calculate the missing probability in the table.

$0.07 + 0.15 + 0.26 + 0.18 = 0.66$

$1 - 0.66$

0.34

(2)

(b) Calculate the probability of a B or C.

$0.15 + 0.26 = 0.41$

0.41

(2)

24. A bag contains 400 coloured counters.
The counters are either yellow, brown or green.
There are 92 yellow counters in the bag.
The probability that a brown counter is chosen from the bag is 0.13

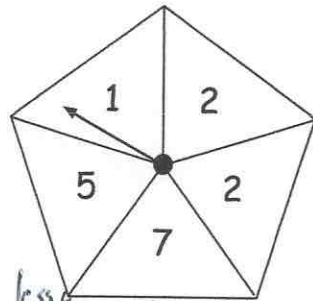Calculate the number of green counters in the bag.

$400 \times 0.13 = 52$ brown
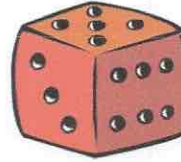
$52 + 92 = 144$ brown and yellow

$400 - 144 = 256$

256

(4)

25. Emily has a spinner with 5 equal sized sections.
    She also has an ordinary six sided dice.



$P(5) = 3/5$ less than

$P(less\ then\ 5) = \dfrac{4}{6}$

Emily says that the spinner is more likely than to dice to land on a number less than 5.

Is Emily correct?
Explain your answer.

$\dfrac{3}{5} < \dfrac{2}{3}$

No, the dice is more likely to land on a number less than 5 $\left(\dfrac{2}{3}\right)$ the the spinner $\left(\dfrac{3}{5}\right)$

(2)

26. The table shows the ages of all the members of a running club.

| Age, x years | Number of members |
|---|---|
| 20 ≤ x < 30 | 27 |
| 30 ≤ x < 40 | 45 |
| 40 ≤ x < 50 | 46 |
| 50 ≤ x < 60 | 33 |
| 60 ≤ x < 70 | 19 |

(a) Find the total number of members of the running club.

$27 + 45 + 46 + 33 + 19 = 170$

170
......................
(1)

The running club has been award one place for the London Marathon.

A member of the running club is chosen at random to receive this place.

(b) Find the probability that the member chosen is less than 40 years old.

$27 + 45 = 72$

$\dfrac{72}{170} = \dfrac{36}{85}$

$\dfrac{36}{85}$
......................
(1)

27. Shona has 9 red pens, 4 blue pens and 7 green pens.

She buys 12 more pens.
The pens she buys are either blue or green.

Shona puts all her pens together and picks one at random.

The probability that she picks a green pen is $\dfrac{1}{2}$

How many green pens did she buy?

|  | Red | Blue | Green |
|---|---|---|---|
| Before | 9 | 4 | 7 |
| + 12 new |  | 3 | 9 |
| Now | 9 | 7 | 16 |

13 (9 and 4)
16 (9 and 7)

9

..........9..........

(3)

28.  Each boy at a school plays one of four sports.

The table shows the probability a student chosen at random plays rugby, football, hockey or cricket.

| Sport | Rugby | Football | Hockey | Cricket |
|---|---|---|---|---|
| Probability | 0.4 | 0.2 | 0.1 | |

A student is chosen at random.

(a) Work out the probability that the student plays cricket.

$$0.4 + 0.2 + 0.1 = 0.7$$

$$1 - 0.7 = 0.3$$

..........0.3..........

**(2)**

There are 600 boys at the school
(b) Work out the number of boys who play rugby.

$$600 \times 0.4 = 240$$

..........240..........

**(2)**

29. A game is played with a five sided spinner.
Each section is a different colour.
The spinner is biased.
The table shows some of the probability of the spinner landing on each colour.

| Colour | Red | Blue | Green | Pink | Black |
|---|---|---|---|---|---|
| Probability | 0.34 | 0.1 | 0.22 | 0.22 | 0.12 |

The probability of green is equal to the probability of pink.

Calculate the probability the spinner lands on pink.

$$0.34 + 0.1 + 0.12 = 0.56$$
$$1 - 0.56 = 0.44$$
$$0.44 \div 2 = 0.22$$

0.22

(3)

30. A hockey club brought two coaches of supporters to a match.
The first coach has 24 supporters on board.
The second coach has 36 supporters on board.

The probability that a supporter on the first bus has a flag is $\frac{1}{4}$

The probability that a supporter on the second bus has a flag is $\frac{2}{9}$

Work out how many of the supporters on the two buses have a flag.

$$\frac{1}{4} \text{ of } 24 = 6$$
$$\frac{2}{9} \text{ of } 36 = 8$$
$$6 + 8 = 14$$

14

(3)

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31. Dennis has a bag of counters.
The counters are red, green, white and pink.
There are 200 counters in the bag.
The probability of a pink counter is 0.15
The probability of a green counter is 0.25
The probability of a red counter is twice the probability of a white counter.

red    2:1    white

Calculate the number of red counters in the bag.

$200 \times 0.15 = 30$ pink

$200 \times 0.25 = 50$ green

80 pink or green

$200 - 80 = 120$

$120 \div 3 = 40$ white

$40 \times 2 = 80$ red

80

(4)

32. A rugby team can win, draw or lose a match.
The table shows the probabilities of each result.

| Result | Win | Draw | Lose |
|---|---|---|---|
| Probability | 0.4 | 0.35 | |

(a) Calculate the missing probability in the table.

$$0.4 + 0.35 = 0.75$$

$$1 - 0.75 = 0.25$$

..........0.25..........

(2)

Each win is worth 2 points.
Each draw is worth 1 point.
Each loss is worth 0 points.
The rugby team plays 20 games in a season.

(b) Work out how many points the rugby team should receive in one season.

$$20 \times 0.4 = 8 \text{ wins}$$

$$20 \times 0.35 = 7 \text{ draws}$$

$$8 \times 2 = 16$$
$$7 \times 1 = \underset{\underline{\phantom{0}}}{7}$$
$$23$$

..........23..........

(3)

**33.** Susan has some beads in a bag.
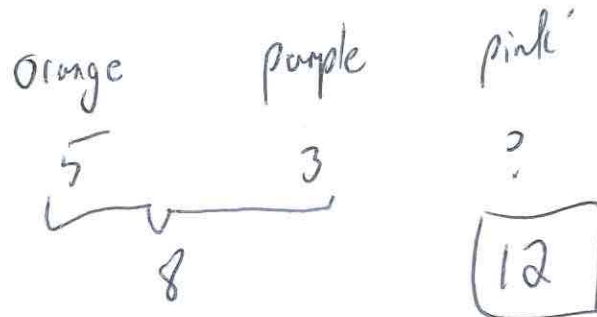
5 of the beads are orange.
3 of the beads are purple.
The rest of the beads are pink.

Susan takes a bead from the bag at random.

The probability that she takes a pink bead is $\frac{3}{5}$  $1 - \frac{3}{5} = \frac{2}{5}$

How many pink beads are in the bag before Susan takes a bead?

Orange    purple    pink

5         3         ?

8                   12

$P(\text{purple or orange}) = \frac{2}{5}$         ×4

$x = 20$         $\frac{8}{x} = \frac{2}{5}$         ×4

............12............

(2)

**34.** The probability of James winning a competition is 0.03

What is the probability that James does not win the competition.

$1 - 0.03 = 0.97$

............0.97............

(1)

**35.** Beatrice flips a biased coin.

The probability that the coin lands on heads is $\frac{3}{20}$

Write down the probability that the coin lands on tails.

$1 - \frac{3}{20} = \frac{17}{20}$

............$\frac{17}{20}$............

(1)

36. Mrs Jenkins is organising a charity raffle.

She sells 300 tickets for £3 each.
The probability that someone wins a prize is 0.2
Each prize cost £8
The profit is donated to charity.

Work out how much money Mrs Jenkins donates to charity.

$$300 \times 3 = £900$$

$$300 \times 0.2 = 60 \text{ winners}$$

$$60 \times 8 = £480$$

$$900 - 480 = 420$$

£ 420

(4)

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37. Over the course of a day, 200 adults and 70 children visit a library.

If an adult is picked at random, the probability they have a library card is 0.87
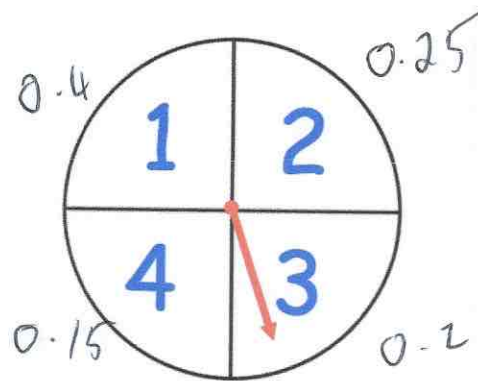If a child is picked at random, the probability they have a library card is 0.4

Find how many people visited the library **without** a library card.

|  | Adults | children |
|---|---|---|
| Total | 200 | 70 |
| with | 174 | 28 |
| without | 26 | 42 |

$$200 \times 0.87 = 174$$
$$70 \times 0.4 = 28$$

$$26 + 42 = 68$$

68

(3)

38. Below is a biased four-sided spinner.

0.4

0.25

1 2

4 3

0.15

0.2

1 − 0.4 = 0.6

The probability of landing on a 2 is 0.25 } 0.4
The probability of landing on a 4 is 0.15
The probability of landing on a 1 is double the probability of a 3

0.4

0.2

The spinner is spun 500 times.

Calculate the number of times you would expect it to land on 3

500 × 0.2 = 100

100

(4)

39. Ricard has two bowls of fruit.

Bowl A contains 8 lemons and 6 limes.
Bowl B contains some lemons, 13 kiwis and 15 limes.

If a piece of fruit is to be chosen from each bowl,

the probability of choosing a lime from Bowl A **is the same as** the probability of choosing a lime from Bowl B.

Work out how many lemons are in Bowl B

|  | lemons | limes | kiwis |
|---|---|---|---|
| Bowl A | 8 | 6 | |
| Bowl B | ? | 15 | 13 |

28

Bowl A   $P(\text{lime}) = \dfrac{6}{14}$

$\qquad\qquad = \dfrac{3}{7}$

Bowl B   $P(\text{lime}) = \dfrac{3}{7}$

$\overset{\times 5}{\curvearrowleft}$

$\dfrac{15}{\text{total}} : \dfrac{3}{7}$

$\underset{\times 5}{\curvearrowright}$

total in Bowl B = 35

$35 - 28 = 7$

................7................

(4)

40. A spinner has three sections.



The table shows some information about the probabilities on the spinner landing on each colour.

| | Yellow | Blue | Purple |
|---|---|---|---|
| Probability | 5x + 0.06 | 0.1 | 2x |

Work out the probability of the spinner landing on yellow.

$(5x + 0.06) + 0.1 + 2x = 1$

$7x + 0.16 = 1$

$7x = 0.84$

$x = 0.12$

$5 \times 0.12 + 0.06 = 0.66$

.........0.66.........

(4)

41. Finn has three flavours of sweet in a box: lemon, strawberry and mint.

60 of the sweets are mint flavoured.

If a sweet is to be chosen at random from the box,

the probability that the sweet is mint flavoured is $\frac{1}{4}$

the probability that the sweet is strawberry flavoured is $\frac{7}{12}$

Work out how many lemon flavoured sweets there are in the box.

$60 \times 4 = 240$ sweets

$\frac{7}{12}$ of $240 = 140$ strawberry sweets

$60 + 140 = 200$

$240 - 200 = 40$ lemon sweets

40

(4)

42. Jack and Hannah both have some red cards and some black cards.

Jack has a total of 96 cards.
For every 1 red card he has, Jack has 5 black cards.

Hannah has a total of 40 cards.
Hannah has twice as many red cards than Jack.

Jack and Hannah put all their cards on an empty table.

One of the cards is picked at random.

Find the probability that the card is black.

red $1:5$ black

$1 + 5 = 6$

Jack

$96 \div 6 = 16$

$96$

$16$ red       $80$ black

Hannah

$\downarrow \times 2$

$40$

$32$ red       $8$ black

total

$48$ red       $88$ black

$\dfrac{11}{17}$

..............................

**(5)**

$P(black) = \dfrac{88}{136}$

43. A drawer contains black and white socks.

*n* of the socks are black.   total $n+12$
The other 12 socks are white.

Toby will take a sock at random from the drawer.

Write down an expression, in terms of n, for the probability that Toby will take a white sock.

$$P(white) = \frac{12}{n+12}$$

$$\frac{12}{n+12}$$
....................

**(2)**

44. A box contains red pens, black pens and green pens.

$3x$ ... $x$
There are three times as many red pens than black pens in the box.
There are twice as many green pens than red pens in the box.
$6x$ ... $3x$
A teacher picks a pen at random from the box.

Work out the probability that the teacher picks a red pen.

let there be   $x$ black pens
$3x$ red pens
$6x$ green pens
$+\overline{\phantom{xxx}}$
$10x$ total

$$P(red) = \frac{3x}{10x} = \frac{3}{10}$$

$$\frac{3}{10}$$
....................

**(3)**

45. Norman has a bag containing 2p and 5p coins.

The ratio of 2p to 5p coins in the bag is 7 : 3

2 more 2p coins and 8 more 5p coins are added to the bag.

A coin is picked at random from the bag.

The probability that this coin is a 5p is $\dfrac{2}{5}$

Find how much money was originally in the bag.

At start $\qquad$ 2p $\qquad$ 5p

$\qquad\qquad\qquad$ $7x$ $\qquad$ $3x$

Coins added $\qquad$ $7x + 2$ $\qquad$ $3x + 8$ $\qquad\qquad$ total : $10x + 10$

$P(5p) = \dfrac{3x + 8}{10x + 10}$

$\dfrac{3x + 8}{10x + 10} = \dfrac{2}{5}$

$28 \times 2p = 56p$

$12 \times 5p = 60p$

$+\overline{\phantom{116p}}$

$\overline{116p}$

$5(3x + 8) = 2(10x + 10)$

$15x + 40 = 20x + 20$

$\qquad -20 \qquad\qquad\quad -20$

$15x + 20 = 20x$

$-15x \qquad\qquad -15x$

$20 = 5x$

$x = 4$

£1.16

........................

(5)