EXAM PAPERS PRACTICE

GCSE OCR Math J560

Combined Probability

Answers

"We will help you to achieve A Star "

Answer 1

(b) Work out the probability that Wendy wins at Hoopla and also wins on the Coconut shy.

$$P(\text{WINS HOOPLA} \underline{\text{AND}} \text{ WINS COCONUT})$$

$$= \quad 0.4 \quad \times \quad 0.3 \qquad \text{2 DPs IN TOTAL.}$$

$$= \quad 4 \times 3 \quad (\text{WITH 2DP})$$

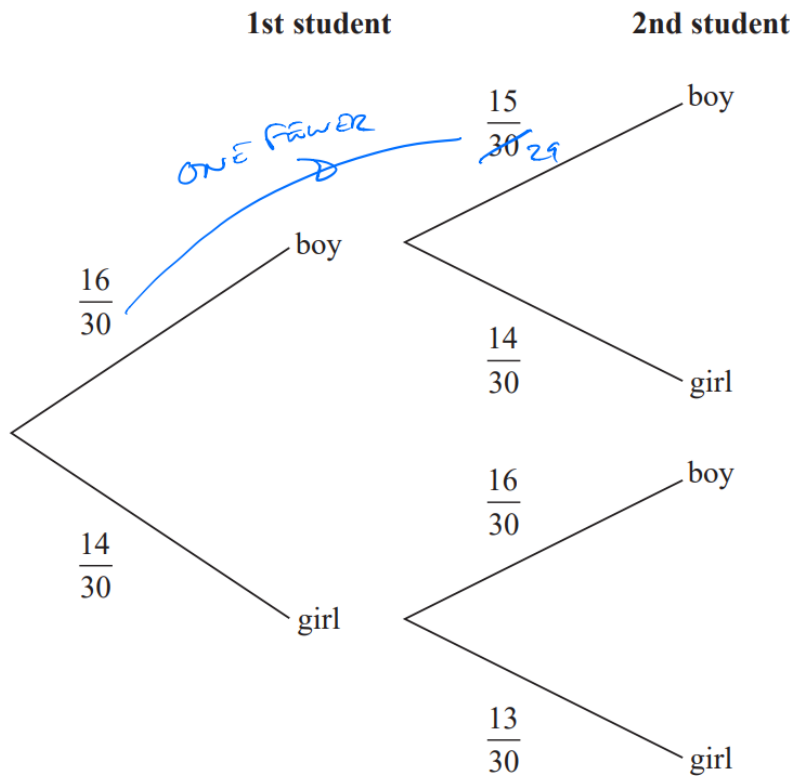$$= \quad \underline{0.12}$$

Answer 2

There are 30 students in Mr Lear's class.
16 of the students are boys.

Two students from the class are chosen at random. — "WITHOUT REPLACEMENT"

Mr Lear draws this probability tree diagram for this information.

1st student   **2nd student**

ONE FEWER

$\frac{16}{30}$ boy

$\frac{15}{30}$ 29   boy

$\frac{14}{30}$ girl

$\frac{14}{30}$ girl

$\frac{16}{30}$ boy

$\frac{13}{30}$ girl

(a) Write down **one** thing that is wrong with the probabilities in the probability tree diagram.
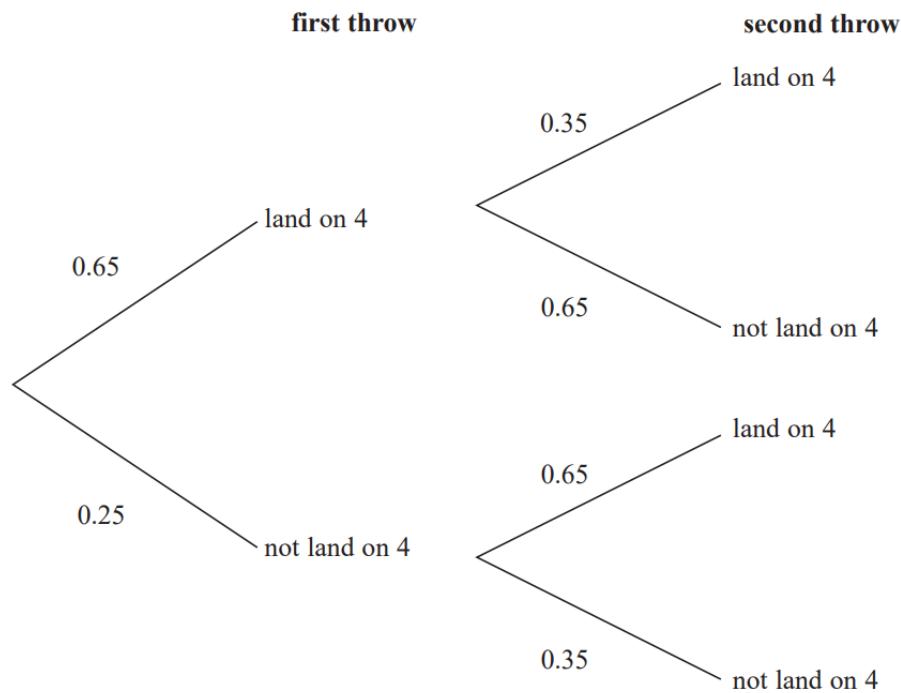
2ND STUDENT PROBABILITIES
SHOULD BE /29.

Answer 3

When a biased 6-sided dice is thrown once, the probability that it will land on 4 is 0.65
The biased dice is thrown twice.

Amir draws this probability tree diagram.
The diagram is **not** correct.

first throw	second throw

land on 4

0.35

land on 4

0.65

0.65

not land on 4

0.65

land on 4

0.25

not land on 4

0.35

not land on 4

Write down **two** things that are wrong with the probability tree diagram.

- $0.65 + 0.25 \neq 1$

- SWITCHED PROBABILITIES
  ON SECOND THROW (AT THE TOP)

TOTAL PROBABILITY = 1
P(A) + P(A') = 1

Answer 4

Paul says,

"With this coin you are twice as likely to get heads as to get tails."

(b) Is Paul correct?
Justify your answer.

No As 300 Is 3 × 100

Answer 5

(b) Calculate the probability that the number on the second tile Jim takes is greater than the number on the first tile he takes.

$$P(1 \text{ AND } 2 \text{ OR } 1 \text{ AND } 3 \text{ OR } 2 \text{ AND } 3)$$

$$= \frac{2}{7} \times \frac{3}{6} + \frac{2}{7} \times \frac{2}{6} + \frac{3}{7} \times \frac{2}{6}$$

$$= \frac{16}{42}$$

$$= \frac{8}{21}$$

1ST	2ND
1	2
1	3
2	3

Answer 6

Shabeen has a biased coin.
The probability that the coin will land on heads is 0.6

Shabeen is going to throw the coin 3 times.

She says the probability that the coin will land on tails 3 times is less than 0.1

Is Shabeen correct?
You must show all your working.

PROBABILITY

$$P(A) + P(A') = 1$$

AND ⟷ ×

OR ⟷ +

$$P(H) + P(T) = 1$$

$$0.6 + P(T) = 1$$
$$-0.6 \qquad\qquad -0.6$$

$$P(T) = 0.4$$

$$P(TTT) = P(T \text{ AND } T \text{ AND } T)$$

$$= 0.4 \times 0.4 \times 0.4$$

$$= 0.064$$

YES, SINCE $0.064 < 0.1$,
SHABEEN IS CORRECT.

Answer 7

(b) Work out the probability that the spinner lands on two different colours.

$$P(G \text{ AND } R \text{ OR } R \text{ AND } G)$$

$$= 0.7 \times 0.3 + 0.3 \times 0.7$$

$$= 0.21 + 0.21$$

$$= \underline{0.42}$$

COMBINED PROBABILITY

"AND" $\longleftrightarrow$ $\times$

"OR" $\longleftrightarrow$ $+$

Answer 8

(b) Work out the probability that, on a day in June, it does **not** rain and my tennis match is cancelled.

$$P(\text{NOT RAIN AND CANCELLED})$$

$$= 0.8 \times 0.05$$

$$= 0.040$$

$$= \underline{0.04}$$

COMBINED PROBABILITY

"AND" $\longleftrightarrow$ $\times$

"OR" $\longleftrightarrow$ $+$

$5 \times 8 = 40$

Answer 9

There are three different types of sandwiches on a shelf.

There are

                4 egg sandwiches,
                5 cheese sandwiches
    and   2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.

PROBABILITY
(COMBINED EVENTS)
AND $\leftrightarrow$ $\times$
OR $\leftrightarrow$ $+$

"WITHOUT REPLACEMENT"

$P($E AND C OR E AND H OR C AND E OR C AND H OR H AND E OR H AND C$)$

$= \dfrac{4}{11} \times \dfrac{5}{10} + \dfrac{4}{11} \times \dfrac{2}{10} + \dfrac{5}{11} \times \dfrac{4}{10} + \dfrac{5}{11} \times \dfrac{2}{10} + \dfrac{2}{11} \times \dfrac{4}{10} + \dfrac{2}{11} \times \dfrac{5}{10}$

1 FEWER
SANDWICH

$= \dfrac{76}{110}$

$20 \times 2 = 40$
$8 \times 2 = 16$
$10 \times 2 = 20$
$\overline{76}$

OR

$P(2 \text{ DIFFERENT}) = 1 - P(2 \text{ SAME})$

$= 1 - P($E AND E OR C AND C OR H AND H$)$

1 FEWER EGGS

$= 1 - \dfrac{4}{11} \times \dfrac{3}{10} + \dfrac{5}{11} \times \dfrac{4}{10} + \dfrac{2}{11} \times \dfrac{1}{10}$

1 FEWER
SANDWICH

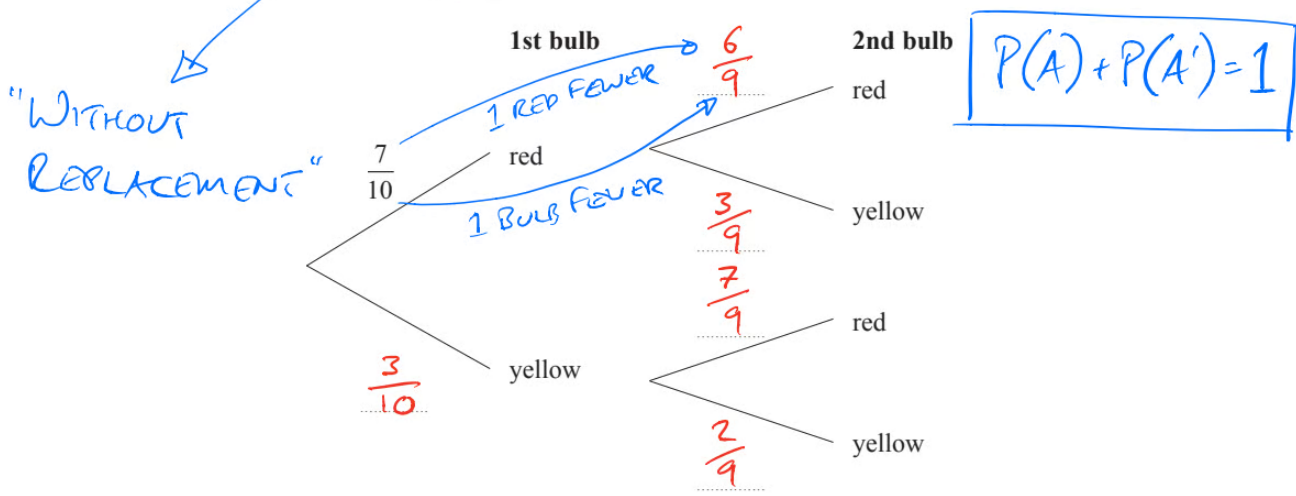$= 1 - \dfrac{34}{110}$

$= \dfrac{76}{110}$

Answer 10

Yvonne has 10 tulip bulbs in a bag.

7 of the tulip bulbs will grow into red tulips.
3 of the tulip bulbs will grow into yellow tulips.

Yvonne takes at random two tulip bulbs from the bag.
She plants the bulbs.

(a) Complete the probability tree diagram.

COMBINED PROBABILITY

"AND" ⟷ ×

"OR" ⟷ +

$P(A) + P(A') = 1$

"WITHOUT REPLACEMENT"

1st bulb

2nd bulb

1 RED FEWER

1 BULB FEWER

$\frac{7}{10}$ red

$\frac{3}{10}$ yellow

$\frac{6}{9}$ red

$\frac{3}{9}$ yellow

$\frac{7}{9}$ red

$\frac{2}{9}$ yellow

Answer 11

Nomusa has 30 sweets.

She has

        18 fruit sweets
        7 aniseed sweets
        5 mint sweets

Nomusa is going to take at random two sweets.
— NOT REPLACED
Work out the probability that the two sweets will **not** be the same type of sweet.
You must show all your working.

COMBINED PROBABILITY
"AND" ⟷ ×
"OR" ⟷ +

$$P(A') = 1 - P(A)$$

TOTAL PROBABILITY = 1
$$P(A) + P(A') = 1$$

$$P(\text{NOT THE SAME}) = 1 - P(\text{SAME})$$

$$= 1 - P(F \text{ AND } F \text{ OR } A \text{ AND } A \text{ OR } M \text{ AND } M)$$

1 FEWER FRUIT

$$= 1 - \left(\frac{18}{30} \times \frac{17}{29} + \frac{7}{30} \times \frac{6}{29} + \frac{5}{30} \times \frac{4}{29} \right)$$

1 FEWER SWEET

$$= \frac{251}{435}$$

Answer 12

There are 7 blue counters, 3 green counters and 1 red counter in a bag. **(11 COUNTERS)**
There are no other counters in the bag.

Hubert takes at random 2 counters from the bag. **"WITHOUT REPLACEMENT"**

(a) Work out the probability that both counters are blue.

$$P(B \text{ AND } B)$$

ONE FEWER
BLUE

$$= \frac{7}{11} \times \frac{6}{10}$$

ONE FEWER
COUNTER

$$= \frac{42}{110}$$

COMBINED PROBABILITY

"AND" ⟷ ×

"OR" ⟷ +

Answer 13

There are n sweets in a bag.
6 of the sweets are orange.
The rest of the sweets are yellow.

Hannah takes at random a sweet from the bag.
She eats the sweet.
↳ WITHOUT REPLACEMENT
Hannah then takes at random another sweet from the bag.
She eats the sweet.

The probability that Hannah eats two orange sweets is $\frac{1}{3}$

(a) Show that $n^2 - n - 90 = 0$

COMBINED PROBABILITY

"AND" ⟷ ×

"OR" ⟷ +

$$P\left(\text{ORANGE AND ORANGE}\right) = \frac{1}{3}$$

$$\frac{6}{n} \xrightarrow{\text{EATEN 1 ORANGE}} \times \frac{5}{n-1} = \frac{1}{3}$$

EATEN A SWEET

GROF:

$$3n(n-1) \times \frac{30}{n(n-1)} = \frac{1}{3} \times 3n(n-1)$$

GROB:

$$90 = n(n-1)$$

$$90 = n^2 - n$$

$$-90 \qquad\qquad -90$$

$$0 = n^2 - n - 90$$

Answer 14

John has an empty box.
He puts some red counters and some blue counters into the box.

The ratio of the number of red counters to the number of blue counters is 1 : 4

"WITHOUT
REPLACEMENT"

Linda takes at random 2 counters from the box.

The probability that she takes 2 red counters is $\dfrac{6}{155}$

How many red counters did John put into the box?

$= x$

COMBINED PROBABILITY

"AND" $\longleftrightarrow$ ×

"OR" $\longleftrightarrow$ +

$$P(R \text{ AND } R) = \frac{6}{155}$$

1 FEWER RED

$$\frac{x}{5x} \times \frac{x-1}{5x-1} = \frac{6}{155}$$

1 FEWER COUNTER

$$155 \times 5(5x-1) \times \frac{x-1}{5(5x-1)} = \frac{6 \times 155 \times 5(5x-1)}{155}$$

R : B

1 : 4

$x : 4x$

TOTAL $= x + 4x$

$= 5x$

GROF: $155(x-1) = 30(5x-1)$

GROF GROBLET
FIND ANSWER!

GROB: $155x - 155 = 150x - 30$

$-150x \qquad\qquad -150x$

LET: $5x - 155 = -30$

$+155 \qquad +155$

$$\frac{5x}{5} = \frac{125}{5}$$

D =

$$x = 25$$

$5 \overline{)12^25} = 25$

Answer 15

(b) Give a reason why David's actual profit may be different to the profit he expects to make.

- RANDOM CHANCE - MORE OR FEWER PRIZES MAY BE WON

OR

- MORE OR FEWER THAN 30 MAY PLAY