TREE DIAGRAMS (HIGHER TIER)

GRADE 8

AtoZrevision

Examination Practice Questions

You should have:

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.
For some questions, you may need tracing paper.

Instructions

- Use **black** ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The marks for each question are shown in brackets.
- Use the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions been carefully compiled from or modelled on a variety of past papers and will generally get more challenging as the document progresses. Some of the later questions will go beyond the core grade level for this topic.

Advice

- Read each question carefully before you start to answer it.
- Don’t forget to have fun.
- Check your answers at the end.

Q1. AtoZrevision.com

A bag contains 4 blue, 4 red and 4 white counters.

Two counters are chosen at random without replacement.

What is the probability that the counters are different colours?

$1 - \left(\frac{4}{12} \times \frac{3}{11} + \frac{4}{12} \times \frac{3}{11} + \frac{4}{12} \times \frac{3}{11} \right)$

M1 M1

$= \frac{96}{132}$

A1

.....

(4 marks)

Q2. AtoZrevision.com

There are 16 sweets in a bowl.

4 of the sweets are blackcurrant.

5 of the sweets are lemon.

7 of the sweets are orange.

Anna, Ravi and Sam each take at random one sweet from the bowl.

Work out the probability that the 5 lemon sweets are still in the bowl.

M1

$\frac{4}{16}$ B, $\frac{7}{16}$ O

M1

$\frac{3}{15}$ B, $\frac{7}{15}$ O $\quad \frac{12}{240}$

$\frac{4}{15}$ B, $\frac{6}{15}$ O $\quad \frac{28}{240}$

$\frac{7}{15}$ O, $\frac{6}{15}$ B $\quad \frac{28}{240}$

$\frac{7}{15}$ O, $\frac{6}{15}$ O $\quad \frac{42}{240}$

M1

$= \frac{110}{240}$

A1

.....

(4 marks)

Q3. AtoZrevision.com

Rebekah takes 2 beads at random, without replacement, from a bag containing 6 blue and 4 green beads.

Rebekah takes a third bead from the remaining 8 beads in the bag.

Given that the first two beads are the same colour, what is the probability that the third bead is also the same colour as the first two?

$\left(\frac{6}{10} \times \frac{5}{9}\right) + \left(\frac{4}{10} \times \frac{3}{9}\right) = \frac{30}{90} + \frac{12}{90} = \frac{42}{90}$

$\left(\frac{6}{10} \times \frac{5}{9} \times \frac{4}{8}\right) + \left(\frac{4}{10} \times \frac{3}{9} \times \frac{2}{8}\right) =$

$\frac{120}{720} + \frac{24}{720} = \frac{144}{720}$

$\frac{144}{720} \div \frac{42}{90}$

.....

(3 marks)

$A_1 = \frac{3}{7}$

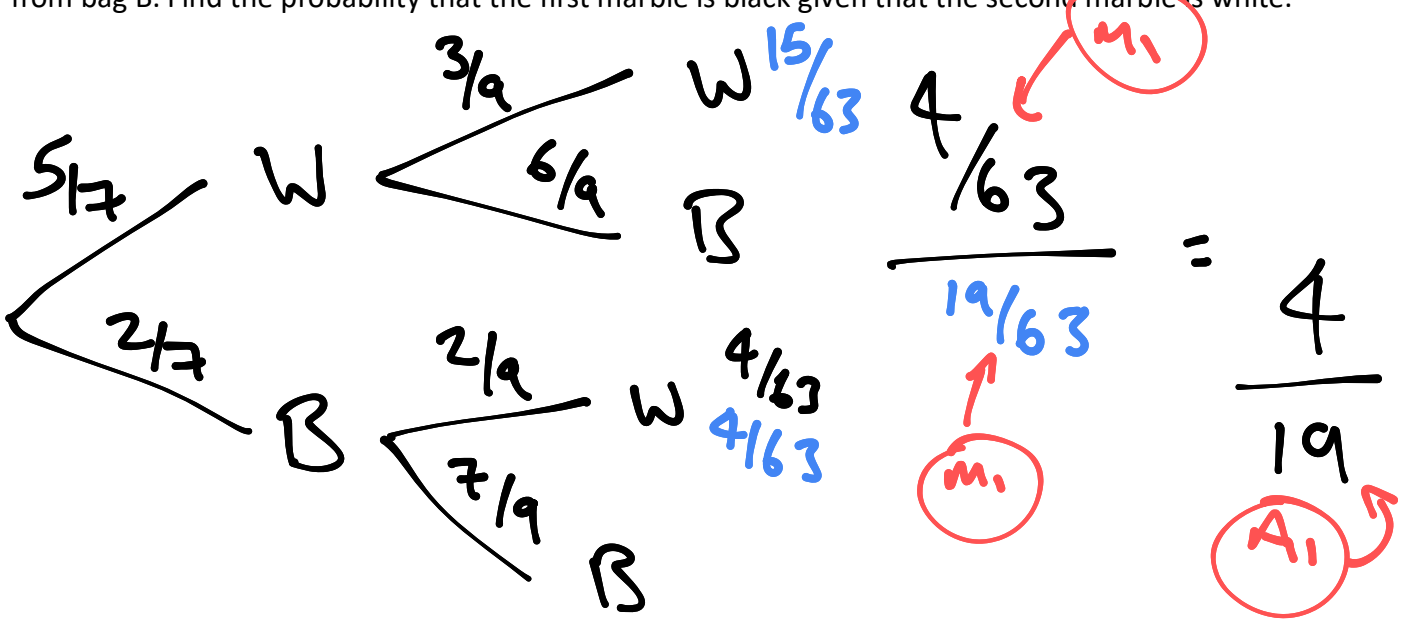
Q4. AtoZrevision.com

Jenny has two bags.

Bag A contains 5 white marbles and 2 black marbles.

Bag B contains 2 white marbles and 6 black marbles.

One marble is selected at random from bag A and placed in bag B. One marble is then selected at random from bag B. Find the probability that the first marble is black given that the second marble is white.



$= \frac{4}{19}$

.....

(3 marks)

Q5. AtoZrevision.com

Ray has nine cards numbered 1 to 9

1	2	3	4	5	6	7	8	9

Ray takes at random three of these cards.

He works out the sum of the numbers on the three cards and records the result.

Work out the probability that the result is an even number.

$\left(\frac{4}{9} \times \frac{3}{8} \times \frac{2}{7}\right) + \left(\frac{5}{9} \times \frac{4}{8} \times \frac{4}{7}\right) + \left(\frac{4}{9} \times \frac{5}{8} \times \frac{4}{7}\right) = \frac{11}{21}$ M1 M1 A1

.....

(4 marks)

Q6. AtoZrevision.com

Marek has 9 cards.

There is a number on each card.

1	2	3	4	5	6	7	8	9

Marek takes at random two of the cards.

He works out the product of the numbers on the two cards.

Work out the probability that the product is an even number.

$\left(\frac{4}{9} \times \frac{3}{8}\right) + \left(\frac{4}{9} \times \frac{5}{8}\right) + \left(\frac{5}{9} \times \frac{4}{8}\right)$ M1 M1

$= \frac{52}{72} = \frac{13}{18}$ A1

.....

(3 marks)

Q7. AtoZrevision.com

There are 8 counters in a bag.

There is a number on each counter.

Fiona takes at random **three** of the counters.

She adds the numbers on the **three** counters to get her total.

Work out the probability that her total is an odd number.

$3/8 \times 2/7 \times 5/6$

M1 ONE CORRECT PROBABILITY

M1 ALL CORRECT

ooo oee eoe eeo

$5/8 \times 4/7 \times 3/6$

$5/8 \times 3/7 \times 2/6$

$3/8 \times 5/7 \times 2/6$

M1 SUM THEM

Sum = $25/56$ A1

.....

(4 marks)

Q8. AtoZrevision.com

There are 9 counters in a bag. There is a number on each counter.

Kal takes at random 3 counters from the bag.

He adds together the numbers on the 3 counters to get his Total.

Work out the probability that his Total is 6

M1 M1

$\left(6 \times 2/9 \times 3/8 \times 4/7\right) + \left(3/9 \times 2/8 \times 1/7\right)$

M1

$= 6/21 + 1/84 = \frac{150}{504}$ A1

.....

(4 marks)

Here are seven tiles.

Jim takes at random a tile.

He does **not** replace the tile.

Jim then takes at random a second tile.

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

M1

$\left(\frac{2}{7} \times \frac{5}{6}\right) + \left(\frac{3}{7} \times \frac{2}{6}\right)$

EITHER

$= \frac{10}{42} + \frac{6}{42}$ M1

$= \frac{16}{42}$ A1

.....

(3 marks)

Q10. AtoZrevision.com

The driving theory test consists of 50 questions.

At least 43 of these questions must be answered correctly to pass the test.

For each question in the test, four possible answers are given. Only one of these answers is correct.

Waldo takes the test.

Waldo knows 78% of the facts assessed in the test.

For each question based on these factrs he selects the correct answer.

On all other questions he randomly selects one of the four possible answers.

A questions is selected at random from the paper.

Calculate the probability that Waldo correctly answers the question.

M1

$[0.78 \times 50 + (50 - 0.78 \times 50) \times 0.25$

$= 39 + 2.75 = 41.75$ M1

$41.75 / 50 = 0.835$

M1 A1

.....

(4 marks)

In a village,

if it rains on one day, the probability that it will rain on the next day is 0.8

if it does not rain on one day, the probability that it will rain on the next day is 0.6

A weather forecaster says,

"There is a 70% chance that it will rain in the village on Monday."

Work out an estimate for the probability that it will rain in the village on Wednesday.

$0.7 \times 0.8 \times 0.8 = {}^{56}/_{125}$

$0.7 \times 0.2 \times 0.6 = {}^{21}/_{250}$

$0.3 \times 0.6 \times 0.8 = 0.144$

$0.3 \times 0.4 \times 0.6 = {}^{9}/_{125}$ +

$= {}^{187}/_{250}$

$= 0.748$

M1 ONE CORRECT MULTIPLICATION

M1 FULLY CORRECT PROCESS

M1

A1

.....

(4 marks)

The table shows information about the number of peas in each of 25 pods.

Number of peas	1	2	3	4	5	6
Number of pods	3	6	5	8	2	1

Laila puts the 25 pods in a bag.

She takes at random two pods without replacement.

Calculate the probability that there is a total of 4 peas in the two pods she takes.

$$2 \times \frac{3}{25} \times \frac{5}{24} + \frac{6}{25} \times \frac{5}{24}$$

$$= \frac{60}{600}$$ A1

M1 ONE CORRECT PRODUCT

M1 3 CORRECT PRODUCTS

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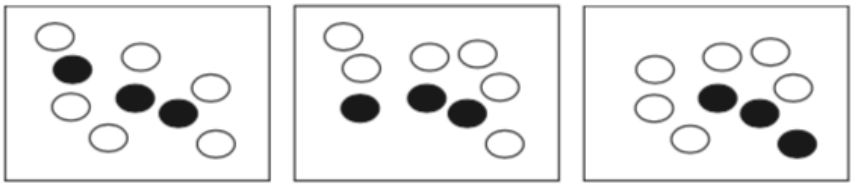
(3 marks)

The diagram shows three boxes containing beads.



Tim takes at random a bead from box **A** and puts it into box **B**.

He then takes at random a bead from box **B** and puts it into box **C**.

Finally, he takes at random a bead from box **C** and puts it into box **A**.

Calculate the probability that there are still 3 black beads and 6 white beads in each of the three boxes.

$6/9 \times 7/10 \times 7/10 = 49/150$ M1

$3/9 \times 4/10 \times 4/10 = 4/75$ M1

$49/150 + 4/75 = 19/50$ A1

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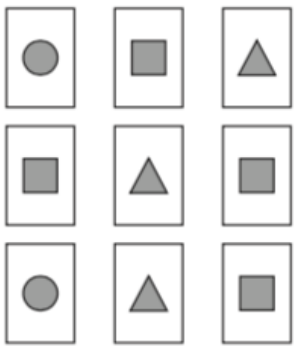
(3 marks)

Here are 9 cards.

Each card has a shape on it.



In a game the cards are turned over so that the shapes are hidden.

The cards are then mixed up.

Katie turns over at random two of the cards.

Work out the probability that these two cards have different shapes on them.

M1 EITHER

$$\left(\frac{4}{9}\times\frac{3}{8}\right)+\left(\frac{4}{9}\times\frac{2}{8}\right)+\left(\frac{3}{9}\times\frac{4}{8}\right)$$

M1

$$+\left(\frac{3}{9}\times\frac{2}{8}\right)+\left(\frac{2}{9}\times\frac{4}{8}\right)+\left(\frac{2}{9}\times\frac{3}{8}\right)$$

$$=\frac{52}{72}$$

M1 FULLY CORRECT PROCESS

A1

.....

(4 marks)