5.5 Two-Way Tables and Frequency Trees: Test Pack

Calculators not allowed · about 55 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A two-way table shows types of lunch and whether students eat in or take away. Every student is in exactly one of four categories. Of all students: 40% eat in and have a hot lunch, 25% take away and have a hot lunch, 20% eat in and have a cold lunch.

Complete: what percentage take away and have a cold lunch?

(2)

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2 A two-way table shows 60 pupils: 36 are right-handed, 24 left-handed. 18 play a musical instrument; 12 of the instrument players are right-handed. Calculate the probability that a randomly chosen pupil is left-handed and does not play an instrument.

(3)

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3 Compare these probabilities and give a reason. From a table of 100 pupils: 40 do drama, 30 do art, 15 do both.

Which is more likely: a pupil does drama but not art, or a pupil does art (including those who also do drama)? Give the probabilities and a sentence explaining why one is larger.

(2)

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4 A survey of 150 people gives this information: 90 like tea, 60 like coffee. Of the tea-likers, 30 also like coffee. Draw a frequency tree showing tea/coffee choices and find how many people like coffee only.

(3)

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5 Stretch: From a two-way table of 240 pupils, 150 play an instrument, 120 do sport. If 80 do both instrument and sport, what is the probability that a pupil chosen at random plays an instrument given that they do sport? Give your answer as a fraction in simplest form.

(3)

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6 44 people were asked about their choice. The two-way table shows the results. Adults: Pizza 6, Pasta 4, Salad 4; Children: Pizza 4, Pasta 14, Salad 12.
One of the Adults is chosen at random. Work out the probability that this person chose Pizza. Give your answer as a fraction in its simplest form.

(3)

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7 The numbers of pets owned by 21 pupils are: 6, 8, 7, 6, 4, 4, 7, 8, 6, 8, 5, 7, 8, 8, 4, 4, 5, 4, 5, 5, 6.
What fraction of the pupils own exactly 6 pets? Give your answer in its simplest form.

(2)

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8 The two-way table shows some information about Year 7 and Year 8.
Year 7: Tea = 9, Juice = ?, total = 22.
Year 8: Tea = ?, Juice = ?, total = 41.
Total for Tea = 33.
Work out the three missing values.

(3)

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9 The numbers of pets owned by 20 pupils are: 4, 2, 4, 5, 2, 4, 1, 5, 1, 1, 3, 2, 3, 1, 1, 5, 4, 4, 3, 2.
Complete a frequency table to find how many pupils own 4 pets.

(2)

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10 From a survey of 120 shoppers, the following information was collected: 70 bought fruit, 50 bought vegetables, and 30 bought both fruit and vegetables.

Construct a two-way table showing counts for shoppers who bought fruit only, vegetables only and both, plus those who bought neither. Fill in the table and give the number who bought neither.

(3)

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11 The numbers of pets owned by 14 pupils are: 6, 4, 4, 4, 6, 8, 6, 4, 4, 7, 7, 6, 7, 5.
Complete a frequency table to find how many pupils own 6 pets.

(2)

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12 Complete this frequency tree. 80 people take part. 48 like music. Of those who like music, 30 prefer pop and the rest prefer classical. Of those who do not like music, 12 prefer jazz.

Fill in the missing counts on the tree and write the number who prefer classical.

(2)

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13 The numbers of pets owned by 14 pupils are: 7, 4, 4, 6, 4, 3, 6, 4, 3, 6, 3, 4, 7, 7.
What fraction of the pupils own exactly 3 pets? Give your answer in its simplest form.

(2)

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14 A two-way table shows hobbies of 200 pupils: 120 play sport, 90 do music, and 50 do both sport and music.

Complete the two-way table showing sport only, music only, both and neither. Then find the probability that a randomly chosen pupil does sport only.

(3)

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15 In a frequency tree of 100 shoppers, 64 pay by card and 36 pay by cash. Of those who pay by cash, 9 are given a discount. Find the number of cash shoppers who are NOT given a discount.

(1)

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16 A pet survey of 50 animals shows 32 are dogs and 18 are cats. Of the 32 dogs, 20 are male. Write down the number of female dogs.

(1)

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17 A frequency tree shows 90 students choosing a lunch option: 60 choose a hot meal and 30 choose a packed lunch. Of the 60 who choose a hot meal, 42 choose meat and the rest choose vegetarian. Of the 30 who choose a packed lunch, 12 choose a wrap and the rest choose a sandwich. Find the total number of students who chose either a vegetarian hot meal or a sandwich packed lunch.

(3)

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18 A school of 400 students is grouped by whether they play a sport and whether they play a musical instrument. Of the 400 students, 260 play a sport, and 90 of those who play a sport ALSO play an instrument. Overall, 150 students play an instrument.

(a) Find the number of students who play an instrument but do NOT play a sport. **(1)**

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(b) Calculate the number of students who play NEITHER a sport NOR an instrument. **(2)**

.....

(c) Calculate the probability that a randomly chosen student plays exactly one of the two activities (sport only or instrument only, not both), giving your answer as a fraction in simplest form. **(1)**

.....

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Mark scheme · 5.5 Two-Way Tables and Frequency Trees: Test Pack

Question 1

method: 100 - (40 + 25 + 20)	M1
15% cao	A1

Answer: **15%**

Question 2

find left-handed instrument players: total instrument 18, right-handed instrument 12 so left-handed instrument = 6	M1
left-handed total = 24 so left-handed who do not play instrument = 24 - 6 = 18	M1
probability = 18/60 = 3/10 cao	A1

Answer: **3/10**

Question 3

correct probabilities: drama but not art = 40 - 15 = 25 so 25/100 = 1/4; art overall = 30/100 = 3/10	M1
explain 1/4 = 0.25 > 0.3? actually 1/4 = 0.25, 3/10 = 0.3 so art is more likely; explanation given correctly	A1

Answer: **Drama not art 1/4; Art 3/10. Art is more likely because 30% do art while only 25% do drama without art.**

Question 4

use both = 30 and coffee total 60 to get coffee only = 60 - 30 = 30	M1
use tea only = 90 - 30 = 60 and neither = 150 - (tea only + coffee only + both) = 150 - (60+30+30) = 30	M1
coffee only = 30 and tree labelled correctly cao	A1

Answer: **Coffee only 30**

Question 5

conditional probability method: P(instrument and sport)/P(sport) = 80/120	M1
reduce fraction to 2/3	A1
final answer 2/3 cao	A1

Answer: **2/3**

Question 6

total for Adults = 14	M1
6/14	M1
3/7 cao	A1

Answer: **3/7**

Question 7

frequency 4 found	M1
4/21 cao	A1

Answer: **4/21**

Question 8

22 - 9	M1
33 - 9 or 41 - (33 - 9)	M1
13, 24, 17 cao	A1

Answer: **Year 7 Juice = 13, Year 8 Tea = 24, Year 8 Juice = 17**

Question 9

systematic counting or a tally of the data	M1
5 cao	A1

Answer: **5**

Question 10

calculate fruit only = 70 - 30 = 40 or vegetables only = 50 - 30 = 20	M1
use totals: neither = 120 - (fruit only + veg only + both) = 120 - (40+20+30) = 30	M1
table completed correctly and neither = 30 cao	A1

Answer: **Fruit only 40, Vegetables only 20, Both 30, Neither 30**

Question 11

systematic counting or a tally of the data	M1
4 cao	A1

Answer: **4**

Question 12

complete music branch: classical = 48 - 30 = 18; non-music total = 80 - 48 = 32	M1
classical = 18 and non-music total = 32 cao	A1

Answer: **Classical 18; Non-music total 32**

Question 13

frequency 3 found	M1
3/14 cao	A1

Answer: **3/14**

Question 14

compute sport only = 120 - 50 = 70 and music only = 90 - 50 = 40	M1
neither = 200 - (70+40+50) = 40	M1
probability sport only = 70/200 = 7/20 cao	A1

Answer: **Sport only 70, Music only 40, Both 50, Neither 40; probability 7/20**

Question 15

27 cao	B1

Answer: **27**

Question 16

12 cao	B1

Answer: **12**

Question 17

vegetarian hot meals = 60 - 42 = 18	M1
sandwich packed lunches = 30 - 12 = 18	M1
36 cao	A1

Answer: **36**

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Question 18

(a) 60 cao **B1**

(a) Answer: **60**

(b) sport only = 260 - 90 = 170, so at least one activity = 170 + 60 + 90 = 320 **M1**

(b) 80 cao **A1**

(b) Answer: **80**

(c) 23/40 cao **B1**

(c) Answer: **23/40**

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