

The statistical enquiry cycle and hypotheses

About 55 minutes Calculator allowed 47 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/stats-the-statistical-enquiry-cycle-and-hypotheses/

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks]

5 numbers have a mean of 13. 4 of the numbers are 5, 7, 8, 20. Find the other number.

A2 Maths skill [2 marks]

Given that $22 \times 23 = 506$, work out 22×2.3 .

Answer

Answer

- A3** Maths skill [2 marks]

Write $\frac{35}{105}$ in its simplest form.

A4 Maths skill [2 marks]

Ali has £120. He spends $\frac{3}{5}$ of it on a coat and $\frac{2}{3}$ of what is left on shoes. How much money does he have left?

Answer

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Owen investigates whether more cars use his road since a supermarket opened. Name the stage of the cycle for each step.

- A** He draws a bar chart of his counts.
- B** He decides to count from 8 am to 9 am.
- C** He notes he counted in a school holiday, so the counts may be low.
- D** He counts the cars with a tally chart.

Hint The stages are plan, collect, process and represent, interpret, evaluate.

- B1** Grace tests whether students who play an instrument do better in a memory test. Name the stage for each step. [2 marks]
- A** She notes all her students came from one school.
 - B** She works out the median score of each group.
 - C** She gives the test to 30 students.
 - D** She says the players scored 3 marks more on average.

EXAMPLE 2

Marcus's hypothesis is "Do older people use the library more?" Explain why it is not suitable. Write a suitable one.

Hint Is it a statement? Could data show it to be true or false? More than whom?

B2 Poppy's hypothesis is "Online shopping is better than shopping in town." Explain why it is not suitable. Write one she could test.

EXAMPLE 3

Ade compares ten years of rainfall in Cardiff and Glasgow using the Met Office website. Is his data primary or secondary? Give one advantage and one disadvantage.

Hint Primary data is collected by the person who uses it.

B3 A PE teacher times her students running 1 km in September and in December. Is her data primary or secondary? Give a reason, and one disadvantage.

EXAMPLE 4

Hannah's hypothesis is "Houses closer to the station sell for higher prices." Give two things for her plan, with a reason for each.

Hint For each thing, say what she does, then "because ...".

B4 Jamal's hypothesis is "Older drivers react more slowly than younger drivers." He has two weeks and no money. Give one thing for his plan, with a reason, and one constraint and how it affects his plan.

EXAMPLE 5

Tariq's hypothesis is "A greater proportion of Year 10 than Year 8 students walk to school." 54 of the 120 Year 10 students walk, and 63 of the 150 Year 8 students. Does the data support his hypothesis? Show your working.

Hint The year groups are different sizes, so compare percentages, not numbers.

B5 Mia's hypothesis is "A greater percentage of cinema customers buy a drink on Saturday than on Monday." 156 of 240 Saturday customers bought a drink, and 57 of 80 Monday customers. Does the data support her hypothesis? Show your working.

C Practice

C1 Lucy has drawn box plots of her data. Which stage comes next?
What does she do in it?

C3 Ellie's hypothesis is "Longer films get higher ratings." What two pieces of data does she need for each film?

C5 A gym's hypothesis is "New members visit more often than older members." In March, 18 new members made 252 visits; 32 older members made 384. Does the data support it? Show your working.

C2 A school nurse investigates students' weights. Give one ethical issue and one way to deal with it.

C4 A shop uses its January sales to test "Ice lolly sales rise as the temperature rises." Why is January not enough?

C6 Ben asked 10 friends how long they spend on their phone each day. Suggest one improvement and say why it helps.

D Exam-style questions

D1 Kara asked 20 people in her town whether they own a pet, and 13 do. She says, "This proves my hypothesis that most people in my town own a pet."

Comment on Kara's conclusion.

D2 Freya's hypothesis is "Employees who cycle to work take fewer days off sick than those who drive." She uses her company's records for last year.

Way to work	Employees	Total days off sick
Cycle	24	108
Drive	60	330

(a) Work out the mean number of days off sick for each group. [2 marks]

Answer Cycle days Drive days

(b) Does the data support her hypothesis? Give a reason.

[1 mark]

(c) Freya writes, "Cycling to work makes people healthier." Give one reason why this may not be valid.

[1 mark]

Total for D2: 4 marks

D3 Sam's hypothesis is "People in the villages use the bus less than people in the town." His plan:

[4 marks]

1. Stand at the bus station in the town on a Monday at 9 am.
 2. Ask the first 30 people he meets how often they use the bus.
 3. Record each answer as "often", "sometimes" or "never".
- Assess Sam's plan.

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 Kim's hypothesis is "Company P runs a greater percentage of its trains on time than Company Q." She says, "Overall, 87% of P's trains were on time and only 70.5% of Q's, so I am right." The table shows trains on time out of trains run. Comment on Kim's conclusion. Show your working.

[4 marks]

Company	Short route	Long route
P	162 of 180	12 of 20
Q	37 of 40	104 of 160

Extension hints

Cover these with paper. Uncover one at a time.

E1 **Hint 1** Work out the percentage on time for each company on each route separately.

Hint 2 Short route: $P \ 162 \div 180 = 90\%$, $Q \ 37 \div 40 = 92.5\%$.

Hint 3 Long route: $P \ 12 \div 20 = 60\%$, $Q \ 104 \div 160 = 65\%$.
Which company does better on each route? Where do most of P's trains run?

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can name the stages of the cycle and write a testable hypothesis.



I can plan data collection with reasons, primary or secondary.



I can use percentages or means to test a hypothesis.

