7.6 How to Write a Hypothesis: 1-hour Pack

AQA 7182 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer every question in the spaces provided. Write in full sentences where a question asks you to explain, justify or discuss. Where a question asks you to write a hypothesis, write a single complete sentence. The marks available are shown in brackets after each question. This is a full question bank rather than a single sitting: work through it in sections, or use one of the timed cuts.

1 A trainee researcher investigating memory writes the following statement before collecting any data: 'Participants who are tested in the same room in which they learned a word list will recall more words correctly out of 25 than participants who are tested in a different room.' State whether this statement is an aim or a hypothesis, and justify your answer.

(Total for Question 1 is 2 marks)

2 A psychologist investigates the capacity of short-term memory. Each participant is read a sequence of digits at a rate of one digit per second and then asked to write the sequence down in the correct order. The sequences increase in length from four digits to twelve digits. Half of the participants are tested in a silent room and half are tested while a recording of office noise is played. The psychologist records the longest sequence each participant recalls in the correct order. Identify the independent variable and the dependent variable in this study.

(Total for Question 2 is 2 marks)

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3 A student writes the following hypothesis for an experiment on caffeine and attention: 'Participants who drink a caffeinated drink will score higher on a sustained attention task.' A teacher marks this as worth fewer than full marks. Explain what is missing from this hypothesis and rewrite it so that both conditions of the independent variable are stated.

(Total for Question 3 is 3 marks)

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4 Three students each write a prediction for an investigation into whether playing a fast-paced video game affects heart rate.

Amelia writes: 'There will be a difference in mean heart rate in beats per minute between participants who play a fast-paced video game for fifteen minutes and participants who read a magazine for fifteen minutes.'

Kwame writes: 'To investigate whether playing a fast-paced video game affects heart rate.'

Niamh writes: 'Participants who play a fast-paced video game for fifteen minutes will have a higher mean heart rate in beats per minute than participants who read a magazine for fifteen minutes.'

(a) State which one of the three statements is an aim rather than a hypothesis. **(1)**

(b) Identify which of the two remaining statements is directional and which is non-directional, and justify your answer. **(2)**

(c) Explain why both Amelia's and Niamh's statements would be judged fully operationalised. **(2)**

(Total for Question 4 is 5 marks)

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5 A psychologist investigates the effect of leading questions on eyewitness testimony. Eighty participants watch the same two-minute film of a collision between two cars. Half are then asked how fast the cars were going when they smashed into each other, and half are asked how fast the cars were going when they contacted each other. Each participant gives a single speed estimate in miles per hour. Previous research in this area consistently finds that stronger verbs produce higher speed estimates.

Write a directional hypothesis for this study.

(Total for Question 5 is 3 marks)

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6 A psychologist investigates a technique for interviewing witnesses. Forty-four adults watch the same three-minute film of a theft in a cafe. Two days later each is interviewed about the film either using the cognitive interview, in which the witness is asked to report everything and to recall the scene in a different order, or using a standard interview consisting of a fixed list of direct questions. The psychologist records the number of accurate details about the theft that each witness reports. Previous research consistently finds that the cognitive interview yields more accurate details.

(a) Write a directional hypothesis for this study. **(3)**

(b) Explain one advantage, for this study, of stating the hypothesis in a directional rather than a non-directional form. **(2)**

(Total for Question 6 is 5 marks)

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7 A psychologist wants to find out whether the duration of short-term memory is affected by preventing rehearsal. She plans a study in which participants are shown a set of three consonants for two seconds and are then asked either to sit quietly for eighteen seconds or to count backwards in threes from a given number for eighteen seconds, after which they write down the three consonants. Each participant completes twelve trials and the psychologist records the number of trials out of twelve on which all three consonants are recalled in the correct order. Research using this procedure consistently finds that preventing rehearsal reduces recall.

(a) Write a suitable aim for this study. **(2)**

(b) Write a directional hypothesis for this study. **(3)**

(c) Identify the independent variable and the dependent variable in this study, stating each in its operationalised form. **(2)**

(Total for Question 7 is 7 marks)

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8 A psychologist investigates whether frustration increases aggressive behaviour in a driving simulator. Forty-four participants complete a ten-minute simulated drive in which they are either repeatedly delayed by slow traffic or given a clear road. The psychologist records the number of times each participant sounds the horn during the drive.
Noah writes: 'Frustrated drivers will be more aggressive.'
Noah's hypothesis would earn no marks. Rewrite it so that it would earn all three marks, and state what you have changed.

(Total for Question 8 is 3 marks)

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9 A psychologist investigates whether the presence of a weapon affects how well a witness recalls a face. Fifty participants watch a film in which a man either carries a kitchen knife or carries a rolled-up newspaper, and then try to identify the man from a set of ten photographs. The psychologist records whether each participant identifies the correct photograph.
Kwame writes: 'Participants who see the man carrying a kitchen knife will identify the correct photograph less often.'

(a) State how many of the three available marks Kwame would earn, and justify your answer. **(2)**

(b) Rewrite Kwame's hypothesis so that it would earn full marks, and state what you have changed. **(3)**

(Total for Question 9 is 5 marks)

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10 A psychologist has written a directional hypothesis for a study of memory and is about to look up the critical value for her statistical test. Explain what difference the fact that her hypothesis is directional rather than non-directional makes to the test she carries out.

(Total for Question 10 is 2 marks)

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11 A psychologist investigates conservation of number in young children. Forty children aged five years each see two rows of eight counters. For half the children the counters in one row are spread further apart while the child watches; for the other half neither row is altered. Each child is then asked whether the two rows contain the same number of counters, and the psychologist records whether the child answers correctly.

Oliwia writes: 'Children who watch one row being spread out will answer correctly less often than children whose rows are not altered.'

Maja writes: 'Spreading one row of counters out will change the answers children give compared with leaving both rows unaltered.'

Leo writes: 'To investigate whether spreading out a row of counters affects conservation of number in five year olds.'

Rank these three statements from the highest scoring to the lowest scoring as answers to 'Write a suitable hypothesis for this study', and justify your ranking.

(Total for Question 11 is 3 marks)

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12 A psychologist investigates whether the type of background lighting affects how accurately people judge facial expressions. Forty-eight participants are randomly allocated to view a set of thirty photographs under either warm lighting or cool lighting, and the number of expressions each participant identifies correctly out of thirty is recorded. Previous research on this question is inconsistent.

(a) Write a suitable hypothesis for this study. **(3)**

(b) Name the inferential statistical test the psychologist should use to analyse her results, and justify your choice. **(3)**

(c) State whether the psychologist should use a one-tailed or a two-tailed test, and justify your answer. **(2)**

(Total for Question 12 is 8 marks)

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Mark scheme · 7.6 How to Write a Hypothesis: 1-hour Pack

Question 1

it is a hypothesis **B1**

justification: it makes a testable prediction about the outcome, naming both conditions of the IV and a measurable DV oe **B1**

Answer: It is a hypothesis, because it predicts a specific outcome rather than stating a purpose, and both the conditions of the independent variable and the dependent variable are measurable.

Question 2

IV: whether the participant is tested in a silent room or with a recording of office noise playing oe **B1**

DV: the longest digit sequence recalled in the correct order oe **B1**

Answer: IV: the listening condition, silent room or office noise. DV: the longest digit sequence recalled in the correct order.

Question 3

only one condition of the IV is named, as there is nothing for the caffeinated group to be compared with oe **B1**

the DV is not operationalised, as 'score higher on a sustained attention task' does not state the scale or units oe **B1**

a rewritten hypothesis naming both conditions and an operationalised DV, for example participants who drink a caffeinated drink will detect more targets out of 40 on a ten-minute sustained attention task than participants who drink a decaffeinated drink oe **B1**

Answer: Participants who drink a caffeinated drink will detect more targets out of 40 on a ten-minute sustained attention task than participants who drink a decaffeinated drink. The original named only the caffeinated condition and did not say how attention was scored.

Question 4

(a) Kwame's statement **B1**

(a) Answer: Kwame's statement.

(b) Niamh's is directional and Amelia's is non-directional **B1**

(b) justification: Niamh predicts which group will have the higher heart rate, whereas Amelia predicts only that the two groups will differ oe **B1**

(b) Answer: Niamh's is directional and Amelia's is non-directional. Niamh names which group will have the higher mean heart rate, while Amelia predicts only that a difference will be found.

(c) both name both conditions of the IV in concrete terms, playing a fast-paced video game for fifteen minutes and reading a magazine for fifteen minutes oe **B1**

(c) both state the DV with its units, mean heart rate in beats per minute oe **B1**

(c) Answer: Both name both conditions of the independent variable concretely, fifteen minutes of a fast-paced video game against fifteen minutes of reading a magazine, and both state the dependent variable with its units, mean heart rate in beats per minute.

Question 5

a statement, not an aim or a question, making a directional prediction, which is the type this stem justifies, stated clearly enough to be understood on a single reading oe **B1**

both conditions of the independent variable are named in operationalised form: whether the question uses the verb 'smashed' or the verb 'contacted' oe **B1**

the dependent variable is stated in operationalised form: the speed estimate given in miles per hour oe **B1**

Answer: Participants asked how fast the cars were going when they smashed into each other will give a higher mean speed estimate in miles per hour than participants asked how fast the cars were going when they contacted each other.

Question 6

(a) a statement, not an aim or a question, making a directional prediction, stated clearly enough to be understood on a single reading oe **B1**

(a) both conditions of the independent variable are named in operationalised form: the cognitive interview compared with a standard interview of fixed direct questions oe **B1**

(a) the dependent variable is stated in operationalised form: the number of accurate details about the theft reported oe **B1**

(a) Answer: Witnesses interviewed using the cognitive interview will report more accurate details about the theft than witnesses interviewed using a standard interview consisting of a fixed list of direct questions.

(b) any one advantage, for example it permits a one-tailed test, or it commits the researcher to a more precise and more easily falsified prediction oe **B1**

(b) the advantage is developed in context, for example a one-tailed test places the whole region of rejection at the predicted end, so a genuine advantage of the cognitive interview needs less extreme data to reach significance than it would under a two-tailed test oe **B1**

(b) Answer: Because the hypothesis is directional a one-tailed test can be used. A one-tailed test places the whole region of rejection at the predicted end rather than splitting it between both ends, so if the cognitive interview really does yield more accurate details, that difference needs less extreme data to reach significance than it would under a two-tailed test.

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Question 7

(a) a statement of purpose rather than a prediction, for example beginning 'to investigate whether' oe **B1**

(a) the aim names both the rehearsal manipulation and recall of the consonants oe **B1**

(a) Answer: To investigate whether preventing rehearsal during an eighteen-second delay affects how well participants recall a set of three consonants.

(b) a statement, not an aim or a question, making a directional prediction, stated clearly enough to be understood on a single reading oe **B1**

(b) both conditions of the independent variable are named in operationalised form: sitting quietly for eighteen seconds compared with counting backwards in threes for eighteen seconds oe **B1**

(b) the dependent variable is stated in operationalised form: the number of trials out of twelve on which all three consonants are recalled in the correct order oe **B1**

(b) Answer: Participants who count backwards in threes for eighteen seconds will recall all three consonants in the correct order on fewer of the twelve trials than participants who sit quietly for eighteen seconds.

(c) IV: whether the eighteen-second delay is spent sitting quietly or counting backwards in threes oe **B1**

(c) DV: the number of trials out of twelve on which all three consonants are recalled in the correct order oe **B1**

(c) Answer: IV: how the eighteen-second delay is spent, sitting quietly or counting backwards in threes. DV: the number of trials out of twelve on which all three consonants are recalled in the correct order.

Question 8

the rewritten hypothesis names both conditions of the IV: repeatedly delayed by slow traffic and given a clear road oe **B1**

the rewritten hypothesis states the DV in operationalised form: the number of times the horn is sounded during the ten-minute drive oe **B1**

the changes are identified, including that the original named only one condition of the IV, so there was nothing for the frustrated drivers to be compared with oe **B1**

Answer: Participants who are repeatedly delayed by slow traffic will sound the horn more times during the ten-minute simulated drive than participants who are given a clear road. The changes are that the comparison condition has been added and that 'more aggressive' has been replaced by the count of horn soundings.

Question 9

(a) 0 marks **B1**

(a) justification: only one condition of the IV is named, the kitchen knife, with no comparison condition stated, and a one-condition statement scores zero however well the DV is operationalised oe **B1**

(a) Answer: 0 marks. He names only one condition of the independent variable, giving nothing for the knife condition to be compared against. That scores zero however well the dependent variable is operationalised.

(b) a directional prediction of the same form as the original, clearly stated oe **B1**

(b) both conditions of the IV are named: carrying a kitchen knife and carrying a rolled-up newspaper oe **B1**

(b) the change is identified: what was missing from the original and what has been added oe **B1**

(b) Answer: Participants who see the man carrying a kitchen knife will identify the correct photograph from the set of ten less often than participants who see the man carrying a rolled-up newspaper.

Question 10

a directional hypothesis requires a one-tailed test, whereas a non-directional hypothesis requires a two-tailed test oe **B1**

she must read the critical value from the one-tailed column of the table, and at a given significance level this critical value differs from the two-tailed one oe **B1**

Answer: A directional hypothesis is tested with a one-tailed test, so she must read the critical value from the one-tailed column of the table rather than the two-tailed column. At the same significance level the two columns give different critical values.

Question 11

correct order: Oliwia highest, then Maja, then Leo lowest **B1**

Oliwia scores highest because she gives a clear directional prediction naming both conditions of the IV and an operationalised DV, whether the child answers correctly oe **B1**

Leo scores lowest because his statement is an aim, which earns zero, whereas Maja names both conditions and so reaches the one-mark tier, operationalising neither variable oe **B1**

Answer: Oliwia, then Maja, then Leo. Oliwia gives a clear directional prediction with both conditions of the independent variable and an operationalised dependent variable, so 3 marks. Maja names both conditions but operationalises neither variable, so 1 mark. Leo has written an aim rather than a prediction, so 0.

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Question 12

(a) a statement, not an aim or a question, making a non-directional prediction, stated clearly enough to be understood on a single reading oe **B1**

(a) both conditions of the independent variable are named in operationalised form: warm lighting and cool lighting oe **B1**

(a) the dependent variable is stated in operationalised form: the number of facial expressions identified correctly out of thirty oe **B1**

(a) Answer: There will be a difference in the number of facial expressions identified correctly out of thirty between participants who view the photographs under warm lighting and participants who view them under cool lighting.

(b) the Mann-Whitney test, or the unrelated t-test if the data are treated as interval and normally distributed oe **B1**

(b) the hypothesis predicts a difference rather than a relationship oe **B1**

(b) the design is independent groups, since participants are randomly allocated to one lighting condition only, and the data are at least ordinal oe **B1**

(b) Answer: A Mann-Whitney test. The hypothesis predicts a difference rather than a relationship, the design is independent groups because each participant experiences only one lighting condition, and the number correct out of thirty is at least ordinal data.

(c) two-tailed **B1**

(c) because the hypothesis is non-directional: it predicts a difference without stating which condition will score higher oe **B1**

(c) Answer: Two-tailed, because the hypothesis is non-directional: it predicts a difference without saying which lighting condition will score higher.

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