7.6 How to Write a Hypothesis: 2-hour Pack

AQA 7182 · Calculator allowed · about 120 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 developmental psychologist observes infants aged between twelve and eighteen months during a brief separation from their caregiver in an unfamiliar playroom. Infants are placed into one of two groups according to whether a familiar toy from home is present or absent during the separation. An observer records the number of seconds each infant spends crying during a three-minute separation. Identify the independent variable and the dependent variable in this study.

(Total for Question 1 is 2 marks)

2 A psychologist investigates whether the type of feedback a learner receives affects how many practice attempts they make. Learners receive either written feedback on a printed sheet or spoken feedback from a tutor, and the psychologist counts how many practice attempts each learner completes in a thirty-minute session. Identify the independent variable and the dependent variable, and state whether each of them is fully operationalised as described.

(Total for Question 2 is 3 marks)

3 A psychologist plans an experiment on whether listening to music while studying affects test performance. She finds that some previous studies report better performance with music and others report worse performance with music. Explain why a non-directional hypothesis would be appropriate for her study.

(Total for Question 3 is 2 marks)

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4 A psychologist plans an experiment on whether rehearsing a list of words aloud affects recall. Several well-controlled previous studies have all found that rehearsing aloud improves recall compared with rehearsing silently. Explain why a directional hypothesis would be appropriate for her study.

(Total for Question 4 is 2 marks)

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5 A developmental psychologist investigates proximity seeking in infants. Fifty infants aged between twelve and eighteen months are observed in an unfamiliar playroom. Twenty-five are observed with their primary caregiver seated in the room and twenty-five are observed with a friendly but unfamiliar adult seated in the room. An observer records the number of seconds during a five-minute session that the infant spends within one metre of the seated adult. Previous studies of proximity seeking with unfamiliar adults have produced conflicting findings.

Write an appropriate hypothesis for this study.

(Total for Question 5 is 3 marks)

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6 A psychologist investigates separation protest in nursery-aged children. Thirty-two children aged two years are each observed twice in a counterbalanced order. In one session the child's key worker remains in the room throughout; in the other session the key worker leaves the room for three minutes. An observer records the number of seconds the child spends crying during the three-minute period. Well-controlled previous research consistently finds that young children cry more when a familiar adult leaves the room.

Write a directional hypothesis for this study.

(Total for Question 6 is 3 marks)

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7 A social psychologist investigates whether group size affects conformity. Participants sit in a room with either four confederates or eight confederates, all of whom give the same clearly incorrect answer on a simple line judgement task before the participant answers. Each participant completes fifteen critical trials and the psychologist records the number of trials on which the participant gives the same incorrect answer as the confederates. Previous research finds that conformity stops rising once the majority is larger than three or four people, and studies comparing majorities above that size have not pointed clearly in one direction.

Write an appropriate hypothesis for this study.

(Total for Question 7 is 3 marks)

8 A psychologist investigates whether the proximity of an authority figure affects obedience. Sixty participants are asked by a researcher in a laboratory coat to sort a large pile of documents, a task they are told is tedious and optional. For half of the participants the researcher remains in the room throughout; for the other half the researcher gives the instruction and then leaves, delivering all further instructions by telephone. The psychologist records the number of minutes out of thirty for which each participant continues sorting. Previous research consistently finds that obedience falls when the authority figure is not physically present.

Write a directional hypothesis for this study.

(Total for Question 8 is 3 marks)

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9 A clinical psychologist investigates a treatment for a fear of flying. Thirty-six adults who report a fear of flying are randomly allocated to two groups. One group completes six weekly sessions of systematic desensitisation; the other group is placed on a waiting list and receives no treatment during the same six weeks. At the end of the six weeks every participant rates their anxiety about boarding an aircraft on a scale from 0 to 10. Previous well-controlled trials consistently find that systematic desensitisation reduces reported anxiety in specific phobias.

Write a directional hypothesis for this study.

(Total for Question 9 is 3 marks)

10 A psychologist investigates imitation in children. Forty-eight children aged six years each watch a two-minute film of an adult completing a puzzle. Half watch a film in which the adult is praised by a second adult for persisting when the puzzle is difficult; half watch a film in which the adult is ignored. Each child is then given a difficult puzzle and the psychologist records the number of seconds the child spends working on it before asking to stop, up to a maximum of 300 seconds. Previous research consistently finds that children imitate a model who is seen to be rewarded.

Write a directional hypothesis for this study.

(Total for Question 10 is 3 marks)

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11 A psychologist investigates physiological arousal during a stressful task. Forty participants are randomly allocated to two conditions. In the evaluated condition each participant delivers a three-minute talk in front of two people who take notes throughout; in the unevaluated condition each participant delivers the same three-minute talk alone in an empty room. Heart rate in beats per minute is recorded at the end of the talk. Previous research consistently finds that being evaluated by an audience raises physiological arousal.

Write a directional hypothesis for this study.

(Total for Question 11 is 3 marks)

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12 A psychologist investigates self-reported anxiety before public speaking. Fifty-two sixth form students each complete a standardised anxiety questionnaire scored out of 40, on which a higher score indicates greater anxiety. Half complete the questionnaire immediately before giving a two-minute talk to their class; the other half complete it immediately before watching a classmate give a two-minute talk. Previous research consistently finds that anticipating performing raises self-reported anxiety compared with anticipating watching.

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

(b) Explain why the researcher would be wrong to write the hypothesis as 'Students will feel more anxious before giving a talk'. **(2)**

(Total for Question 12 is 5 marks)

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13 A psychologist investigates whether watching a violent film clip affects aggressive responding. Forty-eight participants watch either a ten-minute violent film clip or a ten-minute nature documentary, and then complete a word completion task in which the psychologist counts how many of twenty word stems each participant completes as an aggressive word.
Tobi writes the following hypothesis: 'Participants who watch the violent clip will be more aggressive than participants who watch the nature documentary.'
State how many of the three available marks Tobi would earn, and justify your answer.

(Total for Question 13 is 2 marks)

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14 A psychologist investigates whether the gender of a storybook character affects how children rate a toy. Sixty children aged five years each read a short story in which a character plays with a construction toy. For half the children the character is described as a boy and for half as a girl. Each child then rates how much they would like to play with the toy on a scale from 1 to 5.
Saoirse writes: 'There will be a difference in the rating out of 5 that children give the construction toy between children who read about a boy character and children who read about a girl character.'
Rhys writes: 'Children will rate the toy differently depending on the character.'
State which of these two hypotheses would earn more marks, and justify your answer.

(Total for Question 14 is 2 marks)

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15 A forensic psychologist investigates whether the length of a custodial sentence affects reoffending. Records are examined for two hundred offenders released from prison, half of whom served a sentence of under twelve months and half of whom served a sentence of over three years. The psychologist records whether each offender is reconvicted within two years of release.
Callum writes the following: 'Will offenders who serve a sentence of under twelve months be reconvicted within two years more often than offenders who serve a sentence of over three years?'
Explain why Callum's statement would earn no marks as a hypothesis.

(Total for Question 15 is 2 marks)

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16 A psychologist investigates expressed emotion in the families of people with a diagnosis of schizophrenia. Forty patients recently discharged from hospital are assigned to two groups on the basis of a standardised family interview: those returning to a household rated high in expressed emotion and those returning to a household rated low in expressed emotion. The psychologist records whether each patient is readmitted to hospital within nine months.
Zainab writes: 'Patients returning to a household rated high in expressed emotion will be readmitted to hospital within nine months more often than patients returning to a household rated low in expressed emotion.'
State how many of the three available marks Zainab would earn, and justify your answer fully.

(Total for Question 16 is 3 marks)

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17 A forensic psychologist investigates whether an offender behaviour programme affects impulsivity. Fifty offenders complete a standardised impulsivity questionnaire scored out of 60 both before and after a twelve-week programme; a further fifty complete the same questionnaire twelve weeks apart with no programme in between.
Farhan writes: 'Offenders who complete the twelve-week programme will show a bigger change in impulsivity than those who do not.'
State how many of the three available marks Farhan would earn, and justify your answer fully.

(Total for Question 17 is 3 marks)

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18 A psychologist investigates the effect of mindfulness training on reported stress in carers. Sixty unpaid carers are randomly allocated either to an eight-week mindfulness course or to a waiting list, and all complete a standardised stress questionnaire scored out of 40 at the end of the eight weeks.
Priya writes: 'To see whether mindfulness training reduces the stress scores of unpaid carers compared with a waiting list.'
State how many of the three available marks Priya would earn, and explain your answer.

(Total for Question 18 is 3 marks)

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19 A psychologist investigates whether being observed affects performance on a well-practised task. Forty participants each type a passage they have practised many times, either alone in a room or with two observers watching. The psychologist records the number of words typed correctly per minute.

Oliwia writes: 'Participants who type with two observers watching will type more words correctly per minute than participants who type alone.'

Yusuf writes: 'Participants will type faster when they are watched than when they are alone.'

The examination question read: 'Write a suitable hypothesis for this study.' No previous research is reported, so either a directional or a non-directional form is acceptable.

(a) State how many of the three available marks Oliwia would earn, and how many Yusuf would earn. **(2)**

(b) Explain what separates the two hypotheses. **(2)**

(Total for Question 19 is 4 marks)

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20 A psychologist measures the number of hours of sleep a group of adults reports each night and their score out of 40 on a standardised concentration test, and examines whether the two are related. A student describes the hours of sleep as the independent variable and the concentration score as the dependent variable. Explain why this description is incorrect.

(Total for Question 20 is 2 marks)

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21 A psychologist investigates the relationship between the number of close friends a person reports having and their score on a standardised loneliness questionnaire scored out of 30, on which a higher score indicates greater loneliness. Eighty adults each report their number of close friends and complete the questionnaire. Previous research consistently finds that people with fewer close friends report greater loneliness. Write a directional hypothesis for this study.

(Total for Question 21 is 3 marks)

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22 A psychologist investigates the relationship between the number of minutes of daily exercise an adult reports and their score out of 25 on a standardised sleep quality questionnaire, on which a higher score indicates better sleep. Seventy adults provide both measures. Existing evidence on daily exercise and sleep quality in adults is mixed, with some studies reporting a benefit and others reporting none. Write a non-directional hypothesis for this study.

(Total for Question 22 is 3 marks)

23 A psychologist plans a naturalistic observation of helping behaviour in a supermarket. An observer will stand near the entrance and record, for each shopper who passes a member of staff struggling with a stack of baskets, whether the shopper stops to help. Observations will be made on a weekday morning and on a Saturday afternoon. Write a suitable hypothesis for this observation.

(Total for Question 23 is 3 marks)

24 A psychologist plans a questionnaire study of attitudes to recycling. Two hundred residents will complete a twelve-item questionnaire producing a pro-recycling attitude score out of 60, and will be grouped according to whether their household has a kerbside collection or must take recycling to a central point. Previous surveys consistently report more positive attitudes where collection is easier. Write a directional hypothesis for this study.

(Total for Question 24 is 3 marks)

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25 A psychologist investigates whether the order in which revision topics are studied affects recall. Thirty-two students each study six topics either in the order given in the textbook or in a random order, and then sit a test scored out of 50 covering all six topics. Existing evidence on study order and recall is inconsistent.

(a) Write the alternative hypothesis for this study. **(3)**

(b) Write the null hypothesis for this study. **(2)**

(Total for Question 25 is 5 marks)

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26 A psychologist reports that the difference in recall scores between her two conditions was significant at the 0.01 level.

(a) Explain what is meant by the statement that the difference was significant at the 0.01 level. **(2)**

(b) State what the psychologist may now do with her null hypothesis, and state what she may not conclude. **(2)**

(Total for Question 26 is 4 marks)

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27 A psychologist is planning an experiment to find out whether a short daily gratitude exercise affects mood in sixth form students. She has read six previous studies. Four of them report improved mood after gratitude exercises, but the two best controlled studies, which used larger samples and an active control condition, report no effect at all. Her supervisor tells her that the decision between a directional and a non-directional hypothesis is not a matter of preference but follows from the evidence, and that it has consequences for the analysis.

Discuss the decision the psychologist faces between a directional and a non-directional hypothesis in this study, and explain what follows from that decision for her statistical analysis.

(Total for Question 27 is 8 marks)

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28 A charity that supports carers wants to know whether short, regular breaks help the people who care for a relative at home. The charity can offer some carers a two-hour supervised break twice a week for six weeks, and can contact carers through its own membership list. It has asked a psychologist to investigate.

Design a study the psychologist could carry out to investigate this question. In your answer you must state a fully operationalised hypothesis and say what type of hypothesis it is, and you must justify your choice of experimental design, your operationalisation of the variables, and the inferential statistical test you would use.

(Total for Question 28 is 12 marks)

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Mark scheme · 7.6 How to Write a Hypothesis: 2-hour Pack

Question 1

IV: whether a familiar toy from home is present or absent during the separation oe **B1**

DV: the number of seconds spent crying during the three-minute separation oe **B1**

Answer: IV: presence or absence of a familiar toy from home. DV: the number of seconds spent crying during the three-minute separation.

Question 2

IV: the type of feedback received, written on a printed sheet or spoken by a tutor oe **B1**

DV: the number of practice attempts completed in the thirty-minute session oe **B1**

both variables are fully operationalised, because both conditions of the IV are described concretely and the DV states what is counted and over what period oe **B1**

Answer: IV: type of feedback, written on a printed sheet or spoken by a tutor. DV: the number of practice attempts completed in thirty minutes. Both are fully operationalised, since the IV names two concrete conditions and the DV states the count and the time period.

Question 3

previous findings on music and study performance conflict, so there is no consistent basis on which to predict a direction oe **B1**

a non-directional hypothesis predicts only that a difference in test performance will be found, which is all the existing evidence supports oe **B1**

Answer: The previous studies disagree about whether music helps or harms study performance, so there is no consistent evidence on which to base a prediction of direction. A non-directional hypothesis predicts only that test performance will differ between the two conditions, which is as far as the evidence allows her to go.

Question 4

previous well-controlled research consistently shows rehearsing aloud improves recall, so there is a clear basis for predicting the direction oe **B1**

a directional hypothesis states which condition will recall more words, which makes the prediction more precise and allows a one-tailed test oe **B1**

Answer: Previous research consistently finds that rehearsing aloud improves recall over rehearsing silently, so she can justify predicting which condition will be better. A directional hypothesis states that the aloud condition will recall more words, which is a more precise prediction and permits a one-tailed test.

Question 5

a statement, not an aim or a question, making a non-directional prediction, or a correctly written null hypothesis, 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 seated adult is the infant's primary caregiver or a friendly but unfamiliar adult oe **B1**

the dependent variable is stated in operationalised form: the number of seconds during the five-minute session spent within one metre of the seated adult oe **B1**

Answer: There will be a difference in the number of seconds spent within one metre of the seated adult during the five-minute session between infants observed with their primary caregiver and infants observed with a friendly but unfamiliar adult.

Question 6

a statement, not an aim or a question, making a directional prediction, 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 key worker remains in the room or leaves the room for three minutes oe **B1**

the dependent variable is stated in operationalised form: the number of seconds the child spends crying during the three-minute period oe **B1**

Answer: Children will spend more seconds crying during the three-minute period when their key worker leaves the room than when their key worker remains in the room.

Question 7

a statement, not an aim or a question, making a non-directional prediction, or a correctly written null hypothesis, 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 participant sits with four confederates or with eight confederates oe **B1**

the dependent variable is stated in operationalised form: the number of the fifteen critical trials on which the participant gives the same incorrect answer as the confederates oe **B1**

Answer: There will be a difference in the number of the fifteen critical trials on which participants give the same incorrect answer as the confederates between participants sitting with four confederates and participants sitting with eight confederates.

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Question 8

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 researcher remains in the room or gives all further instructions by telephone from another room oe **B1**

the dependent variable is stated in operationalised form: the number of minutes out of thirty for which the participant continues sorting the documents oe **B1**

Answer: Participants whose researcher remains in the room will continue sorting the documents for more minutes out of thirty than participants whose researcher gives all further instructions by telephone from another room.

Question 9

a statement, not an aim or a question, making a directional prediction, 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 participant completes six weekly sessions of systematic desensitisation or is placed on a waiting list with no treatment oe **B1**

the dependent variable is stated in operationalised form: the anxiety rating about boarding an aircraft given on the scale from 0 to 10 oe **B1**

Answer: Adults who complete six weekly sessions of systematic desensitisation will give a lower mean anxiety rating on the 0 to 10 scale than adults placed on a waiting list with no treatment.

Question 10

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 adult in the film is praised for persisting or is ignored oe **B1**

the dependent variable is stated in operationalised form: the number of seconds the child spends working on the difficult puzzle before asking to stop, up to a maximum of 300 oe **B1**

Answer: Children who watch a film in which the adult is praised for persisting will spend more seconds working on the difficult puzzle before asking to stop than children who watch a film in which the adult is ignored.

Question 11

a statement, not an aim or a question, making a directional prediction, 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 three-minute talk is delivered in front of two note-taking observers or alone in an empty room oe **B1**

the dependent variable is stated in operationalised form: heart rate in beats per minute recorded at the end of the talk oe **B1**

Answer: Participants who deliver the three-minute talk in front of two note-taking observers will have a higher mean heart rate in beats per minute at the end of the talk than participants who deliver the talk alone in an empty room.

Question 12

(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: completing the questionnaire immediately before giving a two-minute talk compared with immediately before watching a classmate give one oe **B1**

(a) the dependent variable is stated in operationalised form: the score out of 40 on the standardised anxiety questionnaire oe **B1**

(a) Answer: Students who complete the anxiety questionnaire immediately before giving a two-minute talk will score higher out of 40 than students who complete it immediately before watching a classmate give a two-minute talk.

(b) only one condition of the IV is named, as there is nothing the talk-giving group is compared with oe **B1**

(b) the DV is not operationalised, since 'feel more anxious' does not state the questionnaire or the score out of 40 that will be used to measure it oe **B1**

(b) Answer: It names only one condition of the independent variable, giving nothing for the talk-giving group to be compared against, and it does not operationalise the dependent variable, since 'feel more anxious' says nothing about the anxiety questionnaire or its score out of 40.

Question 13

2 marks **B1**

justification: it is a clear directional statement naming both conditions of the IV, but the DV is not operationalised, since 'more aggressive' does not state the count of aggressive word completions out of twenty oe **B1**

Answer: 2 marks. The statement is clear and directional and names both conditions of the independent variable, but the dependent variable is not operationalised, because 'more aggressive' says nothing about the number of aggressive word completions out of twenty.

Question 14

Saoirse's hypothesis **B1**

justification: Saoirse names both conditions of the IV and operationalises the DV as the rating out of 5, whereas Rhys names neither condition explicitly and does not state how the rating is measured oe **B1**

Answer: Saoirse's. She names both conditions of the independent variable, a boy character and a girl character, and operationalises the dependent variable as the rating out of 5. Rhys states neither condition explicitly and gives no measure.

Question 15

it is written as a question rather than as a statement oe **B1**

a hypothesis must be a testable prediction that the data can support or fail to support, and a question predicts nothing, so it scores zero however well operationalised its variables are oe **B1**

Answer: It is phrased as a question, not as a statement. A hypothesis has to be a prediction that the data can support or fail to support, and a question makes no prediction, so it earns nothing even though both variables here are well operationalised.

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Question 16

3 marks **B1**

it is a clear directional statement naming both conditions of the IV, high and low expressed emotion households oe **B1**

the DV is operationalised as readmission to hospital within nine months, which states both the outcome and the time window oe **B1**

Answer: 3 marks. It is clear and directional, it names both conditions of the independent variable, and it operationalises the dependent variable as readmission to hospital within a stated nine-month window.

Question 17

2 marks **B1**

it is a clear directional statement and it names both conditions of the IV, completing the twelve-week programme and not completing it oe **B1**

the DV is not operationalised, since 'a bigger change in impulsivity' does not state the change in score out of 60 on the impulsivity questionnaire oe **B1**

Answer: 2 marks. The statement is clear and directional and both conditions of the independent variable are named, but the dependent variable is not operationalised because it does not refer to the change in score out of 60 on the impulsivity questionnaire.

Question 18

0 marks **B1**

the statement is an aim, not a hypothesis, because 'to see whether' states the purpose of the study rather than predicting an outcome oe **B1**

an aim earns zero however well its variables are described, so the fact that Priya names both conditions and refers to stress scores does not rescue it oe **B1**

Answer: 0 marks. 'To see whether' states the purpose of the study rather than predicting what will be found, so it is an aim. An aim earns nothing on a hypothesis question even when, as here, both conditions and the measure are described.

Question 19

(a) Oliwia earns 3 marks **B1**

(a) Yusuf earns 1 mark **B1**

(a) Answer: Oliwia earns 3 marks and Yusuf earns 1 mark.

(b) Oliwia operationalises the IV as typing with two observers watching against typing alone, whereas 'watched' and 'alone' restate the conditions without the detail the stem gives oe **B1**

(b) Oliwia operationalises the DV as words typed correctly per minute, whereas 'faster' states neither the unit nor the accuracy requirement oe **B1**

(b) Answer: Both name both conditions, so the difference is entirely operationalisation. Oliwia states the conditions as typing with two observers watching against typing alone and the dependent variable as words typed correctly per minute. Yusuf operationalises neither, and 'faster' gives no units and no accuracy requirement.

Question 20

neither variable is manipulated by the researcher, as both hours of sleep and concentration score are simply measured as they occur oe **B1**

in a correlation the two variables are called co-variables, and because nothing is manipulated no statement about cause can be made oe **B1**

Answer: Neither variable is manipulated: both hours of sleep and concentration score are measured as they naturally occur. In a correlation the two measured variables are called co-variables, and because nothing is manipulated the study cannot show that one causes the other.

Question 21

a statement predicting a relationship or correlation, not a difference, and naming its direction as negative oe **B1**

the first co-variable is operationalised: the number of close friends the person reports having oe **B1**

the second co-variable is operationalised: the score out of 30 on the standardised loneliness questionnaire oe **B1**

Answer: There will be a negative correlation between the number of close friends an adult reports having and their score out of 30 on the standardised loneliness questionnaire.

Question 22

a statement predicting a relationship or correlation without naming its direction oe **B1**

the first co-variable is operationalised: the number of minutes of daily exercise reported oe **B1**

the second co-variable is operationalised: the score out of 25 on the standardised sleep quality questionnaire oe **B1**

Answer: There will be a correlation between the number of minutes of daily exercise an adult reports and their score out of 25 on the standardised sleep quality questionnaire.

Question 23

a statement predicting a difference, of either direction, rather than an aim or a question oe **B1**

both conditions are named: a weekday morning and a Saturday afternoon oe **B1**

the behavioural category is operationalised: the proportion or number of shoppers who stop to help the member of staff oe **B1**

Answer: There will be a difference in the proportion of shoppers who stop to help the member of staff between observations made on a weekday morning and observations made on a Saturday afternoon.

Question 24

a directional prediction, which is the type the consistent previous surveys justify oe **B1**

both conditions are named: a household with a kerbside collection and a household that must take recycling to a central point oe **B1**

the DV is operationalised: the pro-recycling attitude score out of 60 on the twelve-item questionnaire oe **B1**

Answer: Residents whose household has a kerbside collection will have a higher mean pro-recycling attitude score out of 60 than residents whose household must take recycling to a central point.

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Question 25

(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: studying the six topics in the order given in the textbook compared with studying them in a random order oe **B1**

(a) the dependent variable is stated in operationalised form: the score out of 50 on the test covering all six topics oe **B1**

(a) Answer: There will be a difference in the mean test score out of 50 between students who study the six topics in the order given in the textbook and students who study them in a random order.

(b) a statement that there will be no difference, with any difference attributed to chance oe **B1**

(b) both conditions and the operationalised DV are retained in the null statement oe **B1**

(b) Answer: There will be no difference in the mean test score out of 50 between students who study the six topics in the order given in the textbook and students who study them in a random order, and any difference found will be due to chance.

Question 26

(a) there is a probability of less than one per cent that a difference this large would have arisen if the null hypothesis were true oe **B1**

(a) the difference is therefore very unlikely to be due to chance alone oe **B1**

(a) Answer: There is less than a one per cent probability that a difference of this size would have occurred if the null hypothesis were true, so the difference is very unlikely to be due to chance alone.

(b) she may reject the null hypothesis and accept the alternative hypothesis oe **B1**

(b) she may not conclude that the result is certain or proved, because a one per cent probability of a chance result remains oe **B1**

(b) Answer: She may reject the null hypothesis and accept the alternative hypothesis. She may not conclude that the result is certain, because there remains up to a one per cent probability that the difference arose by chance.

Question 27

Level 4 Discussion is clear, coherent and well organised. The evidence in the stem is weighed rather than described, and the consequences for the analysis are accurate and explicit. Specialist terminology is used effectively throughout. **7-8**

Level 3 Discussion is mostly clear and organised. The evidence is used to support a position, although some of the reasoning is underdeveloped. Consequences for the analysis are broadly accurate. Specialist terminology is mostly used appropriately. **5-6**

Level 2 Discussion lacks clarity or organisation in places. The evidence is described more than it is weighed, or only one side of the decision is considered. Consequences for the analysis are limited or partly inaccurate. Specialist terminology is used inconsistently. **3-4**

Level 1 Discussion is muddled or very limited. The difference between the two types of hypothesis may be asserted without reference to the stem, and consequences for the analysis are absent or incorrect. Specialist terminology is absent or inappropriate. **1-2**

Indicative content:

- the direction of a hypothesis must be justified by the existing evidence, not by what the researcher hopes to find
- four of the six studies point one way, which on a simple count would favour a directional hypothesis
- counting studies is a weak basis for the decision, because the two studies that report no effect are the better controlled and used an active control condition
- where well-controlled evidence conflicts with less well-controlled evidence the field cannot be said to point consistently in one direction, which favours a non-directional hypothesis
- a non-directional hypothesis predicts only that mood scores will differ between the gratitude condition and the control condition
- a non-directional hypothesis is tested two-tailed, so the critical value is read from the two-tailed column and a difference in either direction can reach significance
- a directional hypothesis would be tested one-tailed, which makes a difference in the predicted direction easier to detect but leaves a difference in the opposite direction undetectable
- choosing a directional hypothesis here would risk a Type II error with respect to a harmful effect, since a fall in mood could not be reported as significant
- whichever type is chosen, both conditions of the independent variable and an operationalised measure of mood must appear in the hypothesis
- the decision should be made and recorded before the data are collected, since choosing the direction afterwards would inflate the chance of a Type I error

Question 28

Level 4 The design is coherent and could be carried out as described. A fully operationalised hypothesis of a correctly identified type is stated. Justifications for the design, the operationalisation and the statistical test are accurate and are tied to the specific features of this study. Specialist terminology is used effectively throughout. **10-12**

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Level 3 The design is mostly coherent and workable. The hypothesis is stated and largely operationalised, and its type is correctly identified. Justifications are mostly accurate, although one is underdeveloped or generic. Specialist terminology is mostly used appropriately. **7-9**

Level 2 The design is partly workable but important details are missing or unclear. The hypothesis is present but one variable is not operationalised, or its type is not identified. Some justification is offered but it is limited or partly inaccurate. Specialist terminology is used inconsistently. **4-6**

Level 1 The design is fragmentary and could not be carried out as described. The hypothesis is absent, is an aim, or leaves both variables unoperationalised. Justification is absent or incorrect. Specialist terminology is absent or inappropriate. **1-3**

Indicative content:

- an independent groups design in which one group of carers receives a two-hour supervised break twice a week for six weeks and a matched group continues without the breaks
- a repeated measures design measuring each carer before and after the six-week period, which controls participant variables but introduces order effects and cannot separate the break from the passage of time
- a matched pairs design pairing carers on hours of care given per week and on the condition of the relative, which controls the most important participant variables without order effects
- the independent variable operationalised as whether the carer receives the two-hour supervised break twice weekly for six weeks or continues with their usual arrangements
- the dependent variable operationalised as the score on a standardised carer strain questionnaire, for example out of 40, administered at the end of the six weeks
- a directional hypothesis is justifiable where the student cites consistent evidence that respite reduces carer strain, and a non-directional hypothesis is justifiable where the student notes that breaks may also increase anxiety about leaving the relative
- a worked hypothesis such as: carers who receive a two-hour supervised break twice a week for six weeks will score lower on the carer strain questionnaire out of 40 than carers who continue with their usual arrangements
- the null hypothesis stated alongside the alternative, with any difference attributed to chance
- a Mann-Whitney test for an independent groups design with at least ordinal data, or a Wilcoxon test for a repeated measures or matched pairs design
- the test is one-tailed for a directional hypothesis and two-tailed for a non-directional one, and the significance level should be set at 0.05 before the data are collected
- sampling from the charity's own membership list produces a volunteer sample, which limits how far the findings generalise to carers who are not charity members
- ethical considerations include informed consent, the right to withdraw, and the difficulty of offering a valued service to one group and not the other, which may be addressed by offering the breaks to the control group after the study

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