Please check the examination details below before entering your candidate information

| Candidate surname | Other names |
|---|---|
| StemUp Model Solution | |

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**Advanced Level**

| Centre Number | Candidate Number |
|---|---|
| | |

# Wednesday 15 January 2020

| Afternoon (Time: 2 hours) | Paper Reference **WPS02/01** |
|---|---|

# Psychology

## International Advanced Subsidiary
## Paper 2: Biological Psychology, Learning Theories and Development

**You do not need any other materials.**

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

## Information

- The total mark for this paper is 96.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- The list of formulae and statistical tables are printed at the start of this paper.
- Candidates may use a calculator.

## Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

*Turn over* ▶

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## FORMULAE AND STATISTICAL TABLES

**Standard deviation (sample estimate)**

$$\sqrt{\left(\frac{\sum(x-\bar{x})^2}{n-1}\right)}$$

**Spearman's rank correlation coefficient**

$$1-\frac{6\sum d^2}{n(n^2-1)}$$

**Critical values for Spearman's rank**

| | Level of significance for a one-tailed test | | | | |
|---|---|---|---|---|---|
| | **0.05** | **0.025** | **0.01** | **0.005** | **0.0025** |
| | **Level of significance for a two-tailed test** | | | | |
| *N* | **0.10** | **0.05** | **0.025** | **0.01** | **0.005** |
| **5** | 0.900 | 1.000 | 1.000 | 1.000 | 1.000 |
| **6** | 0.829 | 0.886 | 0.943 | 1.000 | 1.000 |
| **7** | 0.714 | 0.786 | 0.893 | 0.929 | 0.964 |
| **8** | 0.643 | 0.738 | 0.833 | 0.881 | 0.905 |
| **9** | 0.600 | 0.700 | 0.783 | 0.833 | 0.867 |
| **10** | 0.564 | 0.648 | 0.745 | 0.794 | 0.830 |
| **11** | 0.536 | 0.618 | 0.709 | 0.755 | 0.800 |
| **12** | 0.503 | 0.587 | 0.678 | 0.727 | 0.769 |
| **13** | 0.484 | 0.560 | 0.648 | 0.703 | 0.747 |
| **14** | 0.464 | 0.538 | 0.626 | 0.679 | 0.723 |
| **15** | 0.446 | 0.521 | 0.604 | 0.654 | 0.700 |
| **16** | 0.429 | 0.503 | 0.582 | 0.635 | 0.679 |
| **17** | 0.414 | 0.485 | 0.566 | 0.615 | 0.662 |
| **18** | 0.401 | 0.472 | 0.550 | 0.600 | 0.643 |
| **19** | 0.391 | 0.460 | 0.535 | 0.584 | 0.628 |
| **20** | 0.380 | 0.447 | 0.520 | 0.570 | 0.612 |
| **21** | 0.370 | 0.435 | 0.508 | 0.556 | 0.599 |
| **22** | 0.361 | 0.425 | 0.496 | 0.544 | 0.586 |
| **23** | 0.353 | 0.415 | 0.486 | 0.532 | 0.573 |
| **24** | 0.344 | 0.406 | 0.476 | 0.521 | 0.562 |
| **25** | 0.337 | 0.398 | 0.466 | 0.511 | 0.551 |
| **26** | 0.331 | 0.390 | 0.457 | 0.501 | 0.541 |
| **27** | 0.324 | 0.382 | 0.448 | 0.491 | 0.531 |
| **28** | 0.317 | 0.375 | 0.440 | 0.483 | 0.522 |
| **29** | 0.312 | 0.368 | 0.433 | 0.475 | 0.513 |
| **30** | 0.306 | 0.362 | 0.425 | 0.467 | 0.504 |

**The calculated value must be equal to or exceed the critical value in this table for significance to be shown.**

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**Chi-squared distribution formula**

$$X^2 = \sum \frac{(O-E)^2}{E} \qquad df = (r-1)(c-1)$$

**Critical values for chi-squared distribution**

| | Level of significance for a one-tailed test | | | | | |
|---|---|---|---|---|---|---|
| | **0.10** | **0.05** | **0.025** | **0.01** | **0.005** | **0.0005** |
| | **Level of significance for a two-tailed test** | | | | | |
| **df** | **0.20** | **0.10** | **0.05** | **0.025** | **0.01** | **0.001** |
| **1** | 1.64 | 2.71 | 3.84 | 5.02 | 6.64 | 10.83 |
| **2** | 3.22 | 4.61 | 5.99 | 7.38 | 9.21 | 13.82 |
| **3** | 4.64 | 6.25 | 7.82 | 9.35 | 11.35 | 16.27 |
| **4** | 5.99 | 7.78 | 9.49 | 11.14 | 13.28 | 18.47 |
| **5** | 7.29 | 9.24 | 11.07 | 12.83 | 15.09 | 20.52 |
| **6** | 8.56 | 10.65 | 12.59 | 14.45 | 16.81 | 22.46 |
| **7** | 9.80 | 12.02 | 14.07 | 16.01 | 18.48 | 24.32 |
| **8** | 11.03 | 13.36 | 15.51 | 17.54 | 20.09 | 26.12 |
| **9** | 12.24 | 14.68 | 16.92 | 19.02 | 21.67 | 27.88 |
| **10** | 13.44 | 15.99 | 18.31 | 20.48 | 23.21 | 29.59 |
| **11** | 14.63 | 17.28 | 19.68 | 21.92 | 24.73 | 31.26 |
| **12** | 15.81 | 18.55 | 21.03 | 23.34 | 26.22 | 32.91 |
| **13** | 16.99 | 19.81 | 22.36 | 24.74 | 27.69 | 34.53 |
| **14** | 18.15 | 21.06 | 23.69 | 26.12 | 29.14 | 36.12 |
| **15** | 19.31 | 22.31 | 25.00 | 27.49 | 30.58 | 37.70 |
| **16** | 20.47 | 23.54 | 26.30 | 28.85 | 32.00 | 39.25 |
| **17** | 21.62 | 24.77 | 27.59 | 30.19 | 33.41 | 40.79 |
| **18** | 22.76 | 25.99 | 28.87 | 31.53 | 34.81 | 42.31 |
| **19** | 23.90 | 27.20 | 30.14 | 32.85 | 36.19 | 43.82 |
| **20** | 25.04 | 28.41 | 31.41 | 34.17 | 37.57 | 45.32 |
| **21** | 26.17 | 29.62 | 32.67 | 35.48 | 38.93 | 46.80 |
| **22** | 27.30 | 30.81 | 33.92 | 36.78 | 40.29 | 48.27 |
| **23** | 28.43 | 32.01 | 35.17 | 38.08 | 41.64 | 49.73 |
| **24** | 29.55 | 33.20 | 36.42 | 39.36 | 42.98 | 51.18 |
| **25** | 30.68 | 34.38 | 37.65 | 40.65 | 44.31 | 52.62 |
| **26** | 31.80 | 35.56 | 38.89 | 41.92 | 45.64 | 54.05 |
| **27** | 32.91 | 36.74 | 40.11 | 43.20 | 46.96 | 55.48 |
| **28** | 34.03 | 37.92 | 41.34 | 44.46 | 48.28 | 56.89 |
| **29** | 35.14 | 39.09 | 42.56 | 45.72 | 49.59 | 58.30 |
| **30** | 36.25 | 40.26 | 43.77 | 46.98 | 50.89 | 59.70 |
| **40** | 47.27 | 51.81 | 55.76 | 59.34 | 63.69 | 73.40 |
| **50** | 58.16 | 63.17 | 67.51 | 71.42 | 76.15 | 86.66 |
| **60** | 68.97 | 74.40 | 79.08 | 83.30 | 88.38 | 99.61 |
| **70** | 79.72 | 85.53 | 90.53 | 95.02 | 100.43 | 112.32 |

**The calculated value must be equal to or exceed the critical value in this table for significance to be shown.**

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**Wilcoxon Signed Ranks test process**

- Calculate the difference between two scores by taking one from the other
- Rank the differences giving the smallest difference Rank 1

  Note: do not rank any differences of 0 and when adding the number of scores, do not count those with a difference of 0, and ignore the signs when calculating the difference
- Add up the ranks for positive differences
- Add up the ranks for negative differences
- T is the figure that is the smallest when the ranks are totalled (may be positive or negative)
- N is the number of scores left, ignore those with 0 difference

**Critical values for the Wilcoxon Signed Ranks test process**

| | **Level of significance for a one-tailed test** | | |
|---|---|---|---|
| | 0.05 | 0.025 | 0.01 |
| | **Level of significance for a two-tailed test** | | |
| ***n*** | 0.1 | 0.05 | 0.02 |
| N=5 | 0 | - | - |
| 6 | 2 | 0 | - |
| 7 | 3 | 2 | 0 |
| 8 | 5 | 3 | 1 |
| 9 | 8 | 5 | 3 |
| 10 | 11 | 8 | 5 |
| 11 | 13 | 10 | 7 |
| 12 | 17 | 13 | 9 |

**The calculated value must be equal to or less than the critical value in this table for significance to be shown.**

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**SECTION A BEGINS ON THE NEXT PAGE.**

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## SECTION A

## BIOLOGICAL PSYCHOLOGY

**Answer ALL questions in this section. Write your answers in the spaces provided.**

**1** Describe the role of the central nervous system (CNS).

*The central nervous system is made up of the brain and the spinal cord. Sensory messages from the body, eg from receptors in the arms, travel along the peripheral nerves and up the spinal cord to the brain, where the information is processed and a decision is made. The brain then sends motor messages back down the spinal cord to muscles or glands, producing an action such as moving the arm. The spinal cord can also carry out simple reflexes without the brain.*

**(Total for Question 1 = 3 marks)**

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**2** Cherry carried out an experiment to investigate the effects of watching scary films on sleep. She had 10 participants aged 12 to 16 years old.

The participants were asked to write down how many hours of sleep they had on average every night over one week. Cherry then asked them to watch a scary film.

The next day, Cherry asked the participants to write down how many hours of sleep they had after watching the scary film.

(a) Identify the independent variable (IV) from the experiment conducted by Cherry.

**(1)**

*The IV was whether or not the participants had watched the scary film (before watching vs after watching it).*

(b) Explain **one** strength and **one** weakness of Cherry using a repeated measures design in her experiment.

**(4)**

Strength

*Because the same 10 participants slept both before and after watching the scary film, individual differences in sleep patterns (eg some teenagers naturally needing more sleep) are controlled, so the change in hours slept is more likely to be caused by the film, making Cherry's results more valid.*

Weakness

*Having recorded their sleep for a week and then being shown a scary film, the participants could guess the aim was to see if scary films affect sleep, so they may show demand characteristics and report fewer hours of sleep afterwards, reducing the validity of her results.*

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The results of Cherry's experiment are shown in **Table 1**.

| | **Mean number of hours slept** |
|---|---|
| **Before watching a scary film** | 9.5 |
| **After watching a scary film** | 6.2 |

**Table 1**

(c) Explain **one** conclusion Cherry could make from the data shown in **Table 1**.

**(2)**

*Cherry could conclude that watching a scary film reduces the number of hours 12 to 16 year olds sleep, as the mean hours slept fell from 9.5 hours before the film to 6.2 hours after it, a decrease of 3.3 hours.*

(d) Explain **one** weakness of Cherry using the mean as a measure of central tendency to analyse her results.

**(2)**

*The mean is distorted by extreme scores, and with only 10 participants one teenager who slept far less than the others after the film (eg 1 hour) would drag the mean of 6.2 hours down, so the mean may not accurately represent how most of Cherry's participants slept.*

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Cherry decided to carry out a statistical analysis on her data.

(e) Explain which statistical test Cherry could use to analyse her data.

**(3)**

*Cherry should use a Wilcoxon signed ranks test. This is because she is looking for a difference in hours slept between two conditions (before and after watching the scary film), she used a repeated measures design with each of the 10 participants giving a score in both conditions, and the data (number of hours slept) is at least ordinal level.*

**(Total for Question 2 = 12 marks)**

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**3** Aya has seasonal affective disorder. She has tried light therapy and found it did relieve her symptoms, but she struggled to find the time to use the light box every day. Aya has decided to try a different therapy.

(a) Describe **one** therapy, other than light therapy, that Aya could use for her seasonal affective disorder.

**(4)**

*Aya could take antidepressant drugs such as SSRIs (selective serotonin reuptake inhibitors), eg fluoxetine. SSRIs block the reuptake of serotonin into the presynaptic neuron, so serotonin stays in the synapse for longer and keeps stimulating the receptors on the postsynaptic neuron. This increases serotonin activity in Aya's brain, which should lift her low mood and reduce her SAD symptoms during the winter months. Aya would take the SSRI as a daily tablet prescribed by her doctor, starting at the lowest dose that improves her symptoms, and unlike the light box it takes only a moment each day.*

(b) Explain **one** weakness of the therapy that Aya could have used described in 3(a).

**(2)**

*Aya may experience side effects from the SSRIs, such as nausea, headaches or feeling dizzy, and SSRIs can take several weeks to work, so she may stop taking them, making the drug therapy less effective for treating her SAD.*

**(Total for Question 3 = 6 marks)**

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**4** Kirk is 15 years old and in the adolescent stage of development. Kirk has become more aggressive, throwing objects against walls, and has started shouting at his parents.

(a) Describe the role that **one** hormone may play in Kirk's aggression.

**(2)**

*As Kirk is an adolescent male his testosterone levels will be rising during puberty. Testosterone is linked to dominance and aggression, so the increase could make him more likely to shout at his parents and throw objects against walls.*

(b) Describe the role of the pre-frontal cortex as an explanation of aggression.

**(3)**

*The pre-frontal cortex controls behaviour, helping us to plan, make decisions and delay gratification of our impulses. It normally inhibits the amygdala, which produces emotional responses such as anger. If the pre-frontal cortex is damaged or less active, the amygdala is no longer inhibited, so aggressive impulses are not controlled and the person is more likely to act on them and behave aggressively.*

**(Total for Question 4 = 5 marks)**

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**5** Evaluate research into the role of genes in aggression.

**(8)**

Twin studies investigate the role of genes in aggression by comparing concordance rates for monozygotic (MZ) twins, who share 100% of their genes, with dizygotic (DZ) twins, who share about 50%. If MZ twins are more concordant, this suggests aggression is partly genetic. McGuffin and Gottesman (1985) found a concordance rate for aggression of 87% for MZ twins compared with 72% for DZ twins. Brendgen et al. (2005) studied 234 pairs of six-year-old twins in Montreal and found that physical aggression was largely explained by genes, with the MZ concordance nearly double the DZ concordance, whereas social aggression was mainly explained by environmental factors. Animal research has also selectively bred aggressive animals, such as mice, to see whether aggressive parents produce aggressive offspring.

A strength of Brendgen et al. (2005) is that aggression was measured using both teacher ratings and peer ratings, and as these were similar the data is likely to be a reliable measure of the children's aggression. Animal breeding studies also have high control: the animals are raised in the same controlled conditions, so aggression in the offspring can be attributed to breeding from aggressive parents rather than the environment. However, animal aggression may be different from human aggression, which is affected by culture and thinking, so the findings may not generalise to humans.

However, twin studies may lack validity, because MZ twins are often treated more alike and share a more similar environment than DZ twins, so their higher concordance could be due to environment rather than genes. Also, the MZ concordance in McGuffin and Gottesman (1985) was 87% and not 100%, so factors other than genes must influence aggression, and Brendgen et al. (2005) themselves found that social aggression was mostly environmental.

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In conclusion, research consistently suggests genes play a role in aggression, especially physical aggression, but because concordance is never 100% and twin studies cannot fully separate genes from environment, aggression is best explained as an interaction between genetic predisposition and environmental factors.

**(Total for Question 5 = 8 marks)**

**TOTAL FOR SECTION A = 34 MARKS**

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## SECTION B

## LEARNING THEORIES AND DEVELOPMENT.

**Answer ALL questions in this section. Write your answers in the spaces provided.**

**6** Georgia is eight years old. She is constantly getting into trouble at school for not listening to the teacher and talking to her friends. She also gets into trouble for regularly forgetting to do her homework.

Georgia's teacher decides to give Georgia a sticker every 10 minutes that she is quiet and does her work. If Georgia talks to her friends the teacher takes a sticker away from her. Once Georgia has enough stickers she can choose a sweet to eat.

(a) Identify the secondary reinforcer used by the teacher.

**(1)**

*The stickers Georgia gets for being quiet and doing her work are the secondary reinforcer.*

(b) Describe the schedule of reinforcement the teacher is using with Georgia.

**(2)**

*The teacher is using a fixed interval schedule of reinforcement, because Georgia receives a sticker after a fixed time period of every 10 minutes, as long as she has been quiet and done her work.*

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(c) Georgia's mother decides to use positive punishment to make Georgia do her homework.

Describe how positive punishment could be used to teach Georgia to do her homework.

**(2)**

*Positive punishment means adding something unpleasant after a behaviour so it is less likely to be repeated. Every time Georgia does not do her homework, her mother could give her something undesired, eg shouting at her or giving her extra chores to do, so she learns to do her homework to avoid this.*

**(Total for Question 6 = 5 marks)**

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**7** Misaki carried out an observation to investigate whether younger drivers, aged 25 years and below, or older drivers, aged 50 years and above, were more likely to use their mobile/cell phone while driving. She used time sampling.

(a) Describe how Misaki may have carried out the observation using time sampling.

**(3)**

*Misaki would choose a location, eg a busy set of traffic lights, and decide on a fixed observation period such as 10 minutes, then stop for a break. She would then repeat the 10-minute observation at different locations and times of day. During each 10-minute period she would make a tally every time she saw a younger driver (25 and below) or an older driver (50 and above) using a mobile phone while driving.*

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Misaki created a tally chart to gather her data.

(b) Draw a tally chart that Misaki could have prepared in order to gather her data.

**(2)**

**Space for drawing**

| Behaviour | Younger drivers (25 years and below) | Older drivers (50 years and above) |
|---|---|---|
| Used mobile phone while driving | | |
| Did not use mobile phone while driving | | |

Tally (eg |||| ||| ) in each box during each 10-minute observation period.

**(Total for Question 7 = 5 marks)**

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**8** Isak has just learnt about psychoanalysis. He is interested in what people dream about. He asked his friends to record what images they could remember from their dreams in one night.

The results are shown in **Table 2**.

| | **Animals** | **People** | **Flying** | **Cannot remember** |
|---|---|---|---|---|
| **Total number of times each image was dreamt about in one night** | 8 | 14 | 1 | 7 |

**Table 2**

(a) Draw an appropriate graph for the results of Isak's research from the data shown in **Table 2**.

**(3)**

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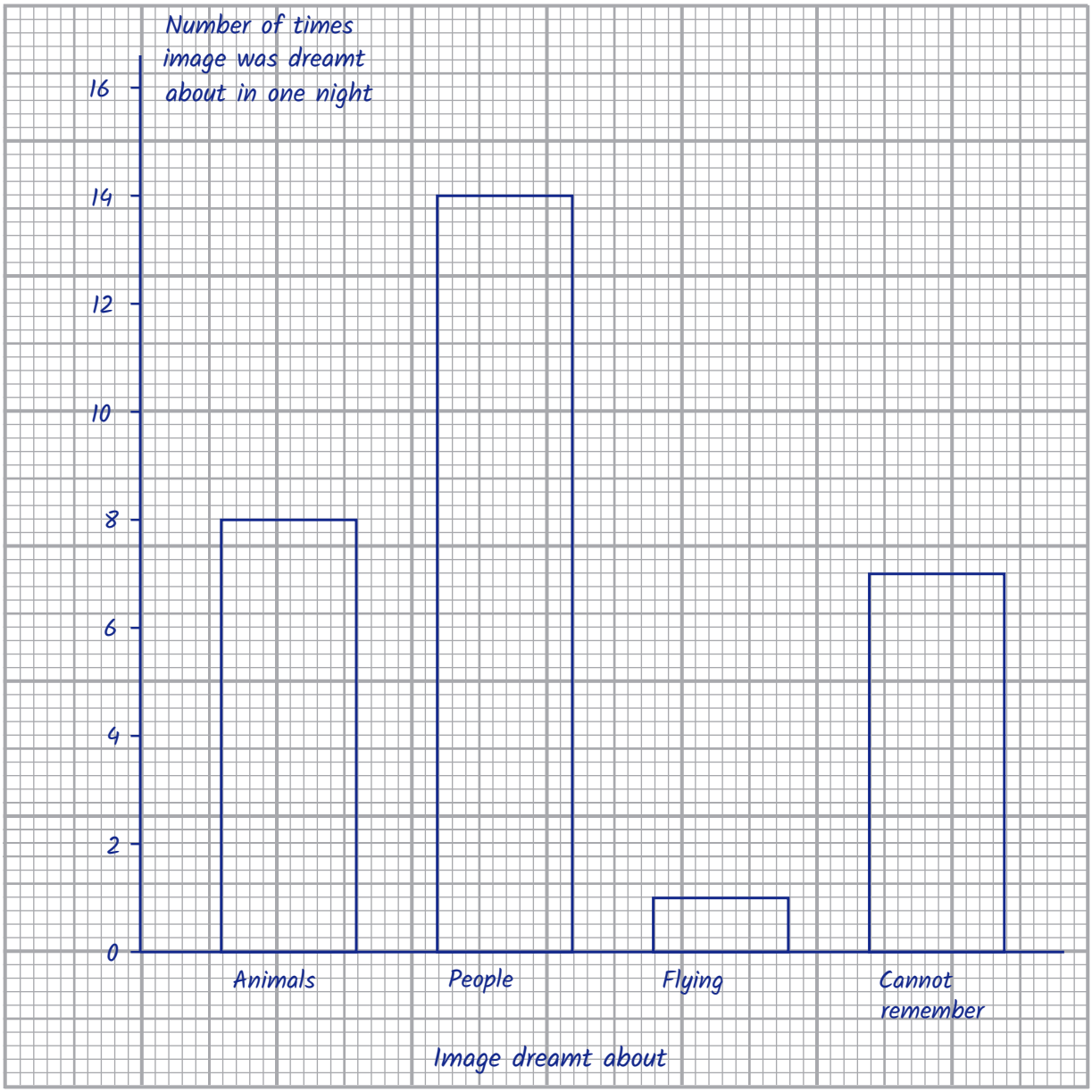




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Title

A bar chart to show the total number of times each image was dreamt about in one night




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(b) As part of his lesson about psychoanalysis Isak learned about transference.

Describe transference as a feature of psychoanalysis.

**(3)**

*In psychoanalysis transference is when the client unconsciously redirects feelings they had towards an important person from their childhood, such as a parent, onto the analyst. The client then feels and behaves towards the analyst as they felt and behaved towards that person, eg showing anger or dependence. The analyst uses this transference to understand the client's repressed conflicts, and interprets it so the client can gain insight into the causes of their behaviour.*

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(c) Explain **one** strength and **one** weakness of psychoanalysis.

**(4)**

Strength

*Psychoanalysis aims to uncover the root cause of a problem in the unconscious, unlike therapies such as systematic desensitisation which only treat the symptoms, so it is more likely to give a permanent cure and be effective in the long term.*

Weakness

*Psychoanalysis relies on the analyst interpreting things like the symbols in dreams, and different analysts may give different interpretations, so it is subjective and cannot be scientifically tested, reducing its scientific credibility as a therapy.*

**(Total for Question 8 = 10 marks)**

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**9** (a) Describe what is meant by the term 'motivation' as used in social learning theory.

**(4)**

*Motivation is the final stage of Bandura's mediational processes (after attention, retention and reproduction); the observer must want to perform the behaviour they have learned. Motivation can be vicarious, so if the observer sees a role model being rewarded for a behaviour they are more likely to imitate it in the hope of getting a similar reward (vicarious reinforcement). If they see the role model being punished they are less motivated to imitate the behaviour, as they want to avoid the punishment. The observer will also be motivated to repeat an imitated behaviour if they are directly rewarded after performing it.*

(b) Explain **one** strength of social learning theory as an explanation of human behaviour.

**(2)**

*Social learning theory can explain how behaviour is learned without being directly reinforced, and this is supported by research: Bandura, Ross and Ross (1961) found that children who watched an adult behave aggressively towards a Bobo doll copied the aggressive actions, even though they were not rewarded.*

**(Total for Question 9 = 6 marks)**

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**10** Mateo is a lecturer at a university and has to carry out research as part of his job. It is the first time he has carried out research with animals.

Mateo is using chimpanzees in his new research project and has to create accommodation for them when they are not taking part in the research. The chimpanzees need to be isolated from each other during the research, which involves an electric shock.

Mateo needs to comply with Home Office Regulations to gain funding for his research.

Discuss the ethical issues of the research that Mateo is conducting in relation to Home Office Regulations.

You must refer to the context in your answer.

**(8)**

*In the UK, research with animals is regulated by the Home Office under the Animals (Scientific Procedures) Act 1986. To carry out his research, licences are needed for the institution, for the project and for each person carrying out procedures. As Mateo has never worked with animals before, he must apply to the Home Office for a personal licence himself, which means showing he has been trained and is competent to handle chimpanzees and give electric shocks safely. Without these licences he cannot do the research or gain his funding.*

*A licence is only granted if the likely benefits of the research outweigh the costs to the animals. Mateo's research involves electric shocks, which cause pain and distress, so he must justify why the findings are important and why the shocks are necessary. He must also follow the 3Rs: replacement (could the research be done without animals?), reduction (using as few chimpanzees as possible) and refinement (keeping the strength and number of shocks to a minimum and stopping if a chimpanzee shows severe distress). This raises an issue, as the Home Office has not licensed research on great apes such as chimpanzees since 1998, so Mateo may find it very hard to justify using them and may need to use a different species.*

*The regulations also cover the housing and care of the animals. Chimpanzees are highly social animals that naturally live in groups, so keeping them isolated from each other during the*

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research causes extra distress. Mateo should keep the isolation as short as possible and carefully reintegrate them into a group once each session is over. Their accommodation must be as natural and stimulating as possible, eg with room to climb, ropes and objects to play with, and appropriate food, temperature and lighting, and they must be checked regularly by trained staff and a vet.

On the other hand, some argue that even with these regulations the cost-benefit decision is subjective and the pain of shocks and isolation can never be fully justified, while others argue research with species so similar to humans could bring real benefits. Overall, the Home Office regulations protect the chimpanzees, but Mateo will only gain his licence and funding if he can show the benefits clearly outweigh the suffering caused.

**(Total for Question 10 = 8 marks)**

**TOTAL FOR SECTION B = 34 MARKS**

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## Section C

**Answer ALL questions in this section. Write your answers in the spaces provided.**

**11** Evaluate the role of infradian rhythms in human behaviour.

**(12)**

An infradian rhythm is a biological rhythm that lasts longer than 24 hours. The main example is the menstrual cycle, which lasts about 28 days. It is regulated by hormones: at the start of the cycle (during menstruation) oestrogen and progesterone are low; oestrogen then rises, causing the lining of the womb to thicken and an egg to be released at ovulation around the middle of the cycle; progesterone then increases to maintain the womb lining, and if the egg is not fertilised both hormones fall and menstruation begins again.

Seasonal affective disorder (SAD) is a type of depression linked to a yearly rhythm, which usually occurs in the winter months. It is thought that reduced sunlight affects the hypothalamus, so that more melatonin is released, causing symptoms such as tiredness, and less serotonin is available, leading to low mood.

Research suggests the menstrual cycle can be affected by external factors. McClintock and Stern (1998) found that 68% of the women exposed to the sweat (pheromones) of other women had their menstrual cycles altered, suggesting the cycle can synchronise between women. However, Wilson (1992) reviewed studies of menstrual synchrony and concluded there was no real effect once methodological problems were taken into account, and Weller and Weller (1995) found no synchrony in the cycles of a team of female basketball players or among best friends. Studies of synchrony often use small samples and rely on women recalling the dates of their periods, which may be inaccurate, so the role of pheromones in this rhythm is questionable.

There is stronger support for the role of light in SAD. Mahon et al. (2016) found that people

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with SAD could not appropriately regulate their serotonin transporters in the brain during the winter months, supporting the idea that serotonin is lower in winter. People living within about 30 degrees either side of the equator, where daylight changes little across the year, rarely get SAD, which supports the claim that it is caused by light levels. Light therapy, which increases exposure to bright light, also relieves symptoms for many sufferers, which has practical value. However, not everyone exposed to dark winters develops SAD, and a variation in the PER3 (period 3) gene has been found in people with the disorder, suggesting genes may predispose some people, so light levels alone cannot fully explain it.

In conclusion, infradian rhythms clearly influence human behaviour: the hormonal changes of the menstrual cycle and the seasonal changes in melatonin and serotonin in SAD affect mood and energy. The evidence for environmental factors such as pheromones altering the menstrual cycle is weak and contradictory, whereas the evidence that light levels affect SAD is stronger, although genetic and individual differences must also be considered.

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**(Total for Question 11 = 12 marks)**

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**12** In your studies you will have learned about the following contemporary studies in detail.

- Brendgen et al. (2005)
- Capafóns et al. (1998)

Evaluate both of these contemporary studies in terms of generalisability and reliability.

**(16)**

*Brendgen et al. (2005) studied 234 pairs of six-year-old twins from Montreal to find out how far genes and environment contribute to physical and social aggression. Aggression was measured using both teacher ratings and peer ratings. 84% of the twins were of European descent and only 3% of African descent. Questionnaires were translated into French where that was the teacher's language, and then translated back into English.*

*In terms of generalisability, a sample of 234 twin pairs is fairly large, so the findings can be considered representative of six-year-old twins in the target population. However, all the twins came from Montreal, an industrialised Western city, so the results may reflect environmental factors there and may not generalise to children in non-industrialised cultures. As 84% were of European descent, the findings are also difficult to apply to children of other ethnic backgrounds. Twins may also differ from single-born children, eg in how they are treated, which further limits generalisability.*

*In terms of reliability, the study used standardised rating questionnaires, which means the procedure could be repeated to check for consistent results. The back-translations were checked by bilingual people for semantic similarity with the original English, so the French and English versions measured aggression consistently. Comparing teacher ratings with peer ratings also increased reliability, as one rater's subjective opinion, eg a child having fallen out with a friend, would be balanced by the other ratings. However, ratings are still subjective judgements rather than direct observations of aggression.*

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Capafóns et al. (1998) tested the effectiveness of systematic desensitisation for fear of flying. 41 participants with a fear of flying were recruited through a media campaign in newspapers, on the radio and on television, and were split into a treatment group and a waiting-list control group. Fear of flying was measured in a variety of ways, including the EPAV-A scale and physiological measures such as heart rate and muscle tension.

In terms of generalisability, the sample of 41 is small, and as it was a volunteer sample it may not be representative of all people with a fear of flying, because only those who felt a strong need to get rid of their fear may have put themselves forward and they may have been especially motivated to improve. Also, fear of flying was the only phobia studied, so the findings may not generalise to other phobias, and systematic desensitisation may not work as effectively for them.

In terms of reliability, the physiological data from heart rate and muscle tension is objective, so it is not affected by interpretation and increases reliability. Capafóns et al. also used a variety of scales that already existed, so other researchers could replicate the study using the same scales to check for consistency of results. However, participants may have shown demand characteristics at the end of the study, feeling they had to say they were less scared of flying, which reduces the reliability of the self-report results.

Overall, both studies have good reliability because they used several measures of the same behaviour (teacher and peer ratings in Brendgen et al., self-report and physiological measures in Capafóns et al.) and standardised tools that can be replicated. Brendgen et al. is more generalisable because of its larger sample, although it is limited to mainly European children from one city, whereas Capafóns et al. is less generalisable because of its small volunteer sample and focus on a single phobia. Therefore, Brendgen et al. is the stronger study in terms

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of generalisability, while both are similarly reliable.

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**(Total for Question 12 = 16 marks)**

**TOTAL FOR SECTION C = 28 MARKS**
**TOTAL FOR PAPER = 96 MARKS**





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