Exercise walk-through

# 4.3
# HL: data analysis and interpretation

International Baccalaureate · IB Diploma · Psychology · HL

# Technology and behaviour

- Many people believe social media makes teenagers unhappy.
- Orben and Przybylski (2019) analysed three large data sets with more than 350,000 teenagers.
- Technology use did have a negative link with well-being, but it explained at most 0.4% of the differences in well-being, about as much as eating potatoes did.
- The data were correlational, so they cannot show the direction of cause: unhappy teenagers may also use more social media.

# Paper 3: worked example

- The claim: *"The use of technology in school may have a negative effect on students' mental health."* Two of the sources are shown below.
- *Two practice sources: a group comparison and a correlation*
- **1.
- Explain one issue that limits the interpretation of the data in Source A.** (3 marks)

# Key terms (2)

- **Overjustification effect**: an expected external reward lowers interest in an activity people already enjoyed.
- **Standard deviation**: a measure of how spread out data are around the **mean**.
- **p-value**: the probability of a result at least this extreme if the null hypothesis were true.
- **Correlation coefficient**: a number from $-1$ to $+1$ that shows the strength and direction of a relationship.

# Exercise 2.1 (a)

**2.1** The number of hours seven students slept before an exam were: 4, 5, 5, 6, 7, 9, 20 (one student recorded a whole weekend by mistake).

(a) Calculate the mean, median and mode. [3]

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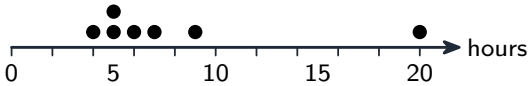
(a) Calculate the mean, median and mode. [3]

(a) mean $= 56 \div 7 = \mathbf{8}$; median $= \mathbf{6}$; mode $= \mathbf{5}$

# Exercise 2.1 (b)

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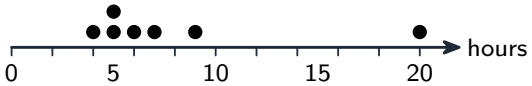
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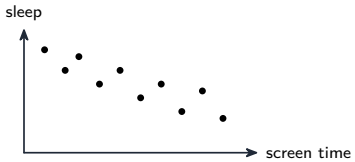

(b) the median, because the extreme score of 20 pulls the mean up

# Exercises 2.2·2.3

**2.2** Two groups had mean test scores of 12.4 and 13.0, with standard deviations of 4.8 and 5.1. Explain why the difference may not be meaningful. [2]



**2.3** A study found $r = -0.56$ between daily screen time and hours of sleep. Describe this correlation. [2]



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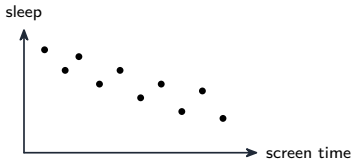
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**2.2**

the difference (0.6) is very small compared with the standard deviations (about 5); the scores overlap a lot, so the difference may be due to chance; an inferential test is needed

**2.3** A study found $r = -0.56$ between daily screen time and hours of sleep. Describe this correlation. [2]




**2.3**

a moderate negative correlation; students with more screen time tend to sleep less, but it does not show that screen time causes less sleep

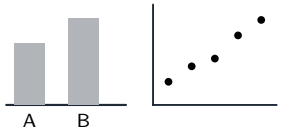
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# Exercises 2.4·2.5

**2.4** A study reports a difference between two groups with $p = 0.03$. Explain what this means, and **one** reason to be careful about the result. [3]

$p = 0.03 < 0.05$

**2.5** Identify a suitable graph for: (a) the mean recall in two conditions; (b) the relationship between hours of sleep and test score. [2]



# Exercises 2.4·2.5

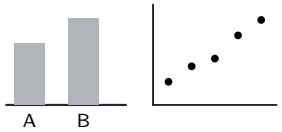
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**2.4**

if there were really no difference (null hypothesis), a difference this big would happen by chance only 3 % of the time; so it is statistically significant at $p < 0.05$; but the effect may be small, especially in a large sample / one study may not replicate

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**2.5**

(a) bar chart; (b) scatter graph

# Exercise 2.6

**2.6** Distinguish between **thematic analysis** and **content analysis**. [2]



themes

stress: ||||

sleep: |||

counts

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## 2.6

thematic analysis finds themes (patterns of meaning) in qualitative data such as transcripts; content analysis counts how often coded categories appear, turning words into numbers

# Exercise 3.1 (a)

**3.1** *(Paper 3 style.)* Claim: **“Using screens late at night harms students’ sleep.”**

**Source A** (fictional data for practice). A researcher asked 60 Year 12 students in one school to record their screen time after 9 p.m. and their hours of sleep for one week, in a diary. The correlation between mean screen time after 9 p.m. and mean sleep was $r = -0.41$. Sleep ranged from about 6 to 8.5 hours.

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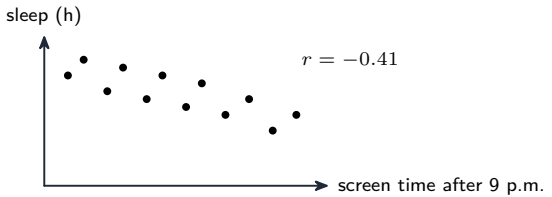
(a) any one, explained: self-reported diary data may be inaccurate, e.g. students underestimate screen time, so the strength of the link is uncertain; or one school, 60 students: may not generalize; or correlational: no direction of cause

# Exercise 3.1 (b)

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(b) Analyse the findings in Source A and state a conclusion linked to the claim. [6]

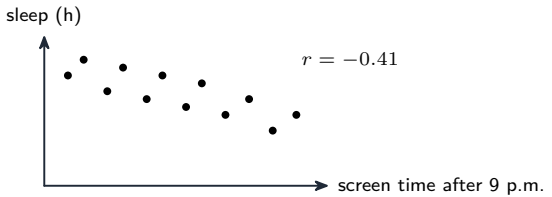


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(b) award up to [6]: a moderate negative correlation, $r = -0.41$; students with more late screen time tend to sleep less; sleep ranged from about 6 to 8.5 hours, so some students sleep less than is often advised; but the correlation does not show cause: students who cannot sleep may use screens more; other variables, e.g. homework or stress, could explain both; conclusion: Source A supports a link between late screen use and less sleep, but not that screens cause it

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(c) award up to [6]: objective measures, e.g. sleep trackers and screen-time logs from the phone; a larger sample from several schools; an experiment: randomly allocate students to “no screens after 9 p.m.” for a week and compare sleep; replication by another researcher / pre-registered plan