



ACT SCALING TEST **Sample Test**

Multiple Choice

DIRECTIONS TO CANDIDATES

- 1 The time allowed for this test is **2 hours 15 minutes**.
- 2 This test has 80 questions, 1 – 80.
- 3 The test contains a range of material drawn from mathematics, science, social science, and the humanities.
- 4 You will obtain your best possible score if you observe these points:
 - (a) Work carefully through the questions in the order in which they are given.
 - (b) Don't waste too much time on any one question; if necessary, go on to the next question and come back to the difficult ones later.
 - (c) If you think you know an answer, mark it — even if you are not certain you are correct. Marks will not be deducted for wrong answers.
 - (d) You must make a serious attempt and answer more than half of the questions.
- 5 Each question has four alternative answers, represented by the letters **A B C D**. You must choose one answer from these alternatives. Having chosen, you should mark your answer correctly on the answer sheet. If you want to change an answer, follow the instructions on the answer sheet.
- 6 After testing, this test book must be handed in with your answer sheet.
- 7 Do not open this book until the supervisor asks you to do so.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD.

UNIT 1

Questions 1 – 4

In the passage below, the speaker is walking to the local library.

As we were waiting for the lights to change, the elderly woman from the pink weatherboard house looked across at me and smiled. ‘You’re from the halfway house, aren’t you?’ she said.

‘The halfway house.’ I liked the way she said it, although I was not sure what she meant by it. Halfway to where, I wondered? 5

I’ve been at this house for around eighteen months. Before that I had been in the hospital for several years. My family had always referred to it non-descriptively as ‘the hospital,’ although if you were to look it up in the telephone book, which I once did, you would find that it was not simply a hospital, but a ‘mental hospital’.

Nobody in my family would dare whisper the word ‘mental’.

10

If that word is not bad enough, when I was reading through some old maps in the reference section of the library one morning I discovered that the hospital was originally known as a ‘lunatic asylum’. When I saw those words on the map even I imagined crazy people in straightjackets, although I’ve never seen a straightjacket and wouldn’t know what one looked like. 15

During the last year or so that I was at the hospital, I, along with two or three other patients, or inmates, as we were called in the old days before we became residents and clients, used to leave the hospital each Thursday night and walk down the road to a nearby hotel. We would stay for a couple of hours, playing pool and drinking beer. I enjoyed those nights, when we were able to enjoy a few hours of freedom, when we could simply be for one night of the week. 20

- 1 In relation to his condition, the family of the writer was
 - A impatient with him.
 - B embarrassed by him.
 - C unaware of his needs.
 - D ignorant of up-to-date treatments.

- 2 The speaker refers to ‘patients’, ‘inmates’, ‘residents’ and ‘clients’ (lines 17 and 18). The speaker sees the different words as an attempt to
 - A make the mentally ill invisible.
 - B deny the rights of the mentally ill.
 - C give greater dignity to the mentally ill.
 - D deny that the mentally ill are vulnerable.

- 3 The comments of the speaker show an awareness of the
 - A causes of mental illness.
 - B best way of treating mental illness.
 - C way language is used to demean the mentally ill.
 - D way language is used to colour perceptions of mental illness.

- 4 The writer enjoyed being able to ‘be for one night of the week’ (line 21) because he
 - A was not being labelled.
 - B could behave irresponsibly.
 - C didn’t have to think of others.
 - D could behave in a convivial manner.

UNIT 2

Question 5



- 5 The point of the cartoon is that people in the 21st century
- A have no meaningful choices.
 - B enjoy having meaningful choices.
 - C have too many meaningful choices.
 - D are in conflict about meaningful choices.

UNIT 3

Questions 6 – 9

DNA found at the scene of a crime can be compared to the DNA of a suspect who may, or may not, have committed the crime. However, even if the DNA matches, there is still a chance that the DNA came from someone other than the suspect. The way in which evidence about the chances of such a match is presented can influence a jury's decision.

In a study, two groups of people were told that a suspect's DNA was a good match to the DNA sample found at the crime scene. The chances of this match were presented to each group using a different method. Both groups were then asked two questions. The results are shown in the table below.

- Unlike older techniques, such as the one considered here, modern DNA profiling techniques can *theoretically* match DNA with almost 100% certainty.

	Method of evidence presentation	Question (i) Was the crime-scene DNA almost certainly the suspect's?	Question (ii) How many out of 500 000 people are expected to have DNA that matches the suspect's?
Group I	Percentage method There is a 0.1% chance that the crime-scene DNA is not the suspect's.	28% said 'Yes'	26% answered correctly
Group II	Frequency method The frequency of people with DNA that matches the crime-scene DNA is 1 in 1000.	8% said 'Yes'	74% answered correctly

- 6 0.1% is equal to
- A 1 chance in 10.
 - B 1 chance in 100.
 - C 1 chance in 1000.
 - D 1 chance in 10 000.

- 7 What is the answer to **Question (ii)**?
- A less than 1
 - B 1
 - C 500
 - D 5000
- 8 Which group was most likely to believe that the crime-scene DNA was almost certainly the suspect's?
- A Group I
 - B Group II
 - C Both groups were equally likely to believe that the DNA was almost certainly the suspect's.
 - D There is insufficient information to determine the answer to this question.
- 9 Suppose DNA evidence was presented to a jury using the frequency method.
Compared to the evidence presented using the percentage method, it is more likely that the jury would find
- A both guilty and innocent suspects guilty.
 - B both guilty and innocent suspects innocent.
 - C an innocent suspect innocent, and a guilty suspect guilty.
 - D an innocent suspect guilty, and a guilty suspect innocent.

UNIT 4

Questions 10 – 13

In the **Rorschach inkblot test** people are asked to respond to 10 ‘meaningless’ inkblots manufactured by accident. These responses are used to assess the personality characteristics and emotional state of a person.

There are different methods of interpreting the responses to the inkblot. Rorschach’s original scoring has been described as a system of pegs on which therapists hang their knowledge of personality. Another widely used method, based on the work of John E. Exner, scores responses with reference to such criteria as the:

- degree of mental activity involved in producing the response;
- location in the image and the specificity of the response;
- accuracy of the response (to what extent a response is faithful to how the actual inkblot looks); and
- contents of the response (what the respondent actually sees in the blot).

In Exner’s scoring different categories are interpreted using a body of data that relates different responses with different personality characteristics.

Critics of the Rorschach inkblot test have called it pseudoscience rather than real science because it attempts to extract objective meaning from responses to meaningless inkblots. Some critics say that the test depends on the subjective interpretation of the therapist, and these interpretations differ significantly.

A Rorschach inkblot

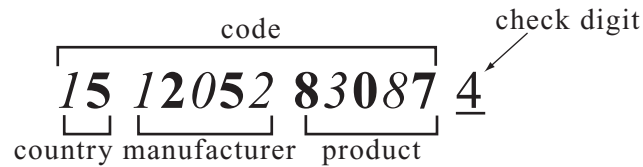


- 10 The Exner method for scoring the Rorschach inkblot test focuses on
- A content but not process.
 - B process but not content.
 - C both content and process.
 - D what is appropriate to an individual case.
- 11 In comparison with Exner's method of scoring, Rorschach's 'original scoring' (lines 5 and 6) was
- A detailed and prescriptive.
 - B unstructured and general.
 - C concerned with emotion rather than personality.
 - D concerned with personality rather than emotion.
- 12 The Rorschach inkblot test can be described as 'pseudoscience' (line 16) in so far as it is
- A too objective.
 - B too subjective.
 - C not based on evidence.
 - D not based on experiment.
- 13 The criticism of the Rorschach inkblot test that 'it attempts to extract objective meaning from responses to meaningless inkblots' (lines 17 and 18) is best described as
- A logical and beyond reasonable criticism.
 - B appropriate in that there is no such thing as objective meaning.
 - C inappropriate because the inkblots can be interpreted in different ways.
 - D inappropriate as the meaning found in responses is understood to be an interpretation.

UNIT 5

Questions 14 – 18

A 13-digit coding system is proposed to give a unique code for all retail products sold. The first two digits of the code represent the country of manufacture. The next five digits represent the manufacturer and the next five digits represent the type of product. The last digit is the *check digit*.



To calculate the check digit:

- add the digits in the odd positions (*italics*) to obtain value X.
- add the digits in the even positions (**bold**) and multiply this result by three to obtain value Y.
- add X and Y to find value Z.
- determine the smallest number that needs to be added to Z to produce a number divisible by ten. The number that needs to be added is the check digit.

In the above example,

- $X = 1 + 1 + 0 + 2 + 3 + 8 = 15$
- $Y = 3 \times (5 + 2 + 5 + 8 + 0 + 7) = 81$
- $Z = 15 + 81 = 96$
- 4 is the smallest number that must be added to 96 to get a number divisible by 10, so the check digit is 4

In the following questions, assume that all the digits 0–9 can be used in the codes.

14 Which of the following codes has a check digit of 9?

I = 19 31290 02121 II = 19 31290 02127

- A **I** only
- B **II** only
- C both **I** and **II**
- D neither **I** nor **II**

- 15 Consider codes of the form: $21\ 34312\ 346pq\ \underline{3}$

If this code follows the rules, which of the following is true?

- A 3 should be added to $59 + p + q$
- B 3 should be added to $59 + p + 3q$
- C 7 should be added to $59 + p + q$
- D 7 should be added to $59 + p + 3q$

- 16 What is the missing part of this code? $79\ 17235\ 0153\ \underline{\quad}\ \underline{7}$

- A 1
- B 2
- C 3
- D 4

- 17 What is the missing part of this code? $32\ 51071\ 3\ \underline{\quad}\ 218\ \underline{5}$

- A 5
- B 6
- C 7
- D 8

- 18 Roger mistakenly multiplies the sum of the numbers in the even positions by two, instead of three.

For which of the following codes would Roger still get the same check digit?

$$\text{I} = 61\ 22206\ 78901 \quad \text{II} = 62\ 22067\ 89012$$

- A I only
- B II only
- C both I and II
- D neither I nor II

UNIT 6

Questions 19 – 22

The political spectrum is usually defined from Left (Liberal) to Right (Conservative). This one dimensional definition is illustrated in the figure 1.



Figure 1 The Usual Political Spectrum

The American political activist David Nolan has argued for expanding the political spectrum by adding a second dimension of Libertarianism and Authoritarianism. The second dimension reflects the amount of authority an individual (or group) believes that government should have over economic and personal matters.

The chart below is a representation Nolan's view of two political dimensions. A position on the chart for an individual (or a group) can be determined by a series of questions about Personal Freedom and Economic Freedom. Responses to the questions are scored (out of 100) to give a position on the chart.

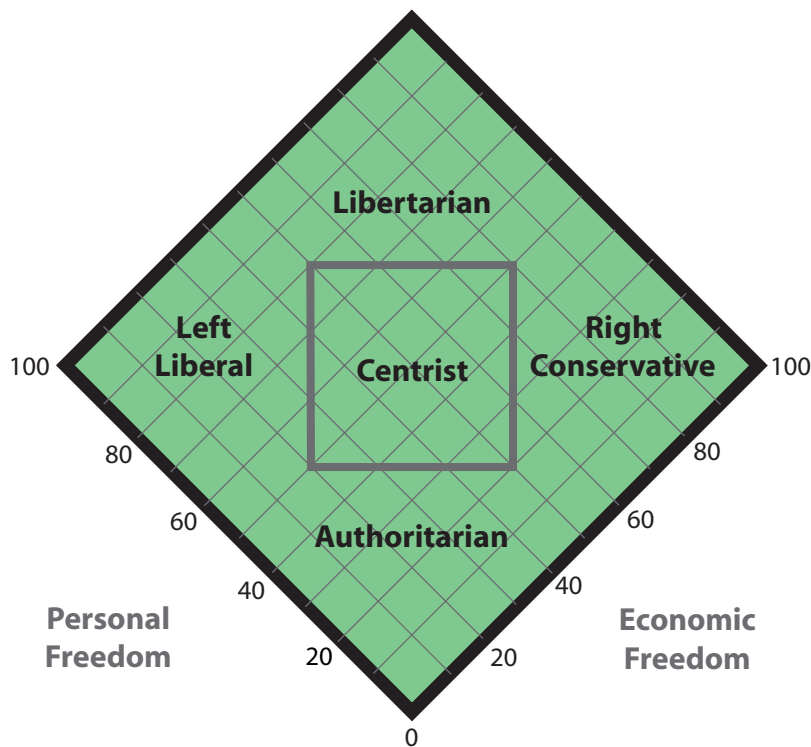


Figure 2 The Nolan Chart

19 The Nolan Chart suggests that Conservatives are

- A low on personal and economic freedom.
- B high on personal and economic freedom.
- C high on personal freedom and low on economic freedom.
- D low on personal freedom and high on economic freedom.

20 Which one of the following pairs of scores is closest to libertarianism?

	Personal Freedom	Economic Freedom
A	90	40
B	20	90
C	50	50
D	30	80

21 The Nolan Chart implies that

- A the right is more libertarian.
- B the left is more authoritarian.
- C both the left and the right can be libertarian.
- D both the left and the right are centrist.

22 The dimensions of the Nolan Chart vary from

- A more to less of one thing.
- B less to more of one thing.
- C less of one thing to less of another.
- D more of one thing to more of another.

UNIT 7

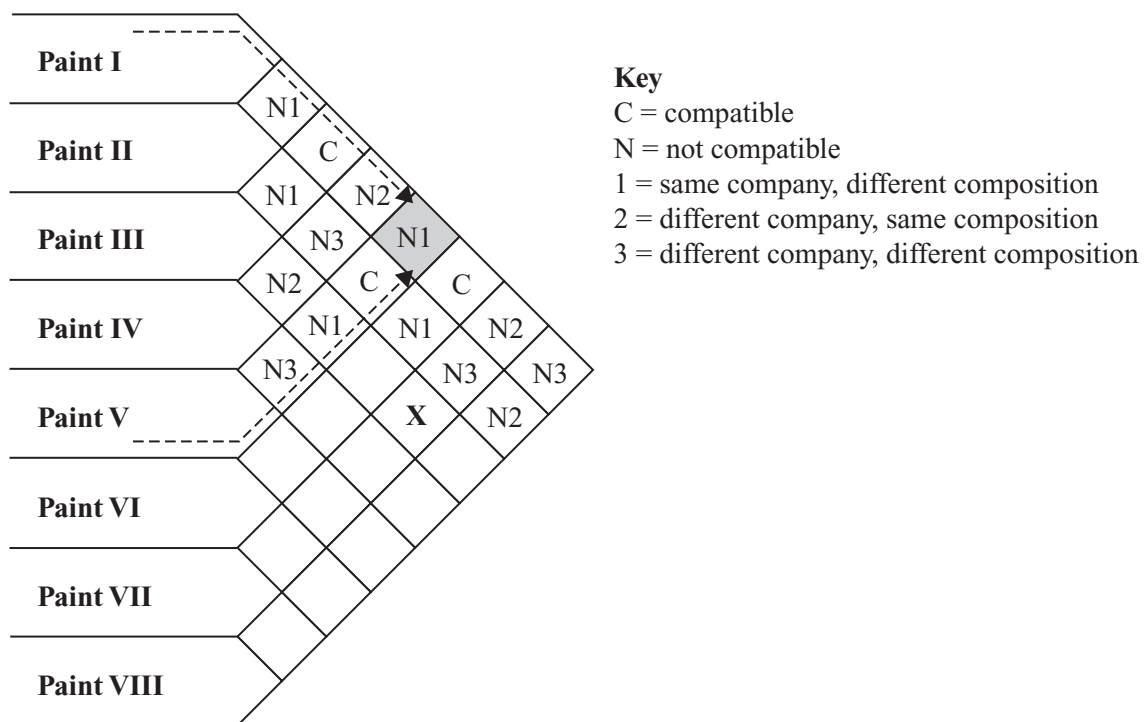
Questions 23 – 25

Paints can be classified according to their *composition* (whether they are oil or acrylic) and their *compatibility* (their ability to mix).

Two companies, P and Q, each make two kinds of paint, oil and acrylic.

- Acrylic paints made by company P are not compatible with acrylic paints made by company Q.
- Oil paints made by company P are not compatible with oil paints made by company Q.
- Oil and acrylic paints are not compatible.

The figure presents some information about eight tubes of paint made by the companies. For example, by following the arrows for **Paints I** and **V** to their point of intersection (shaded square), it is possible to determine that they are made by the same company but are not compatible because they have different compositions.



- 23 According to the figure, **Paint I** is
- A compatible with both **Paint II** and **Paint VII**.
 - B compatible with **Paint II** but not compatible with **Paint VII**.
 - C compatible with **Paint VII** but not compatible with **Paint II**.
 - D not compatible with either **Paint II** or **Paint VII**.

- 24 What should replace **X** in the grid?

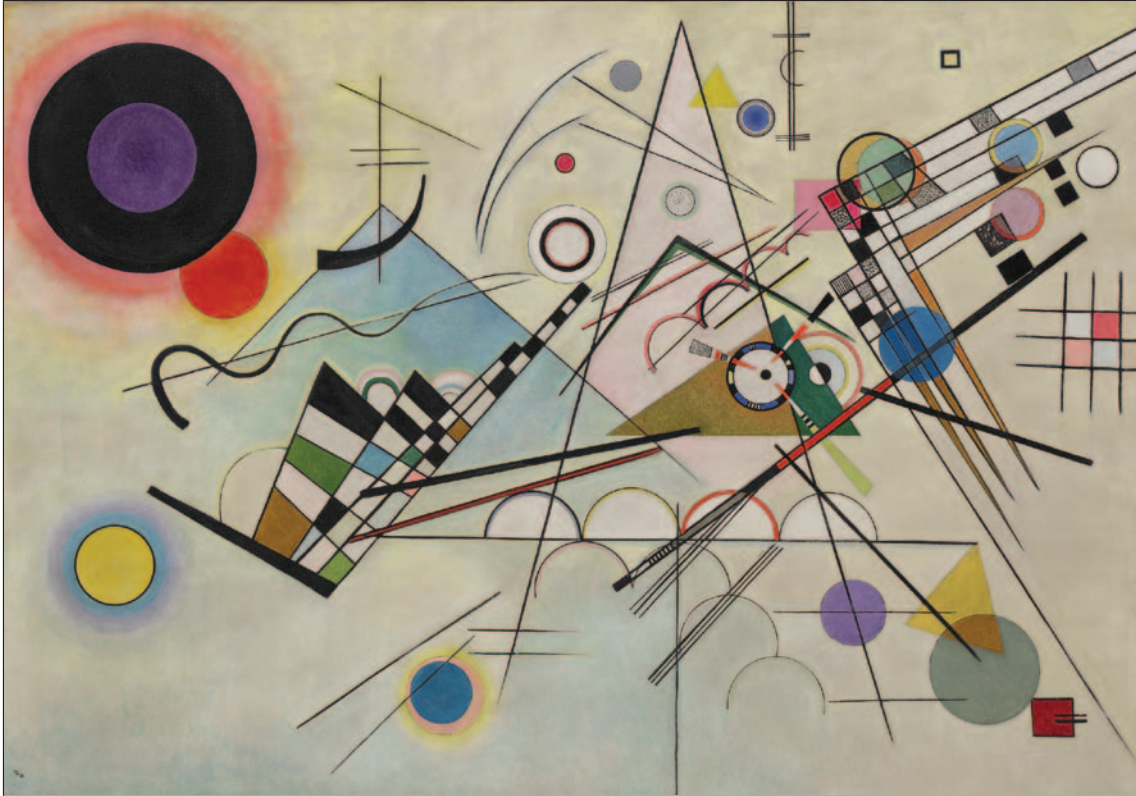


- 25 Suppose **Paint V** is an oil paint.
How many of the other seven paints are also oil paints?
- A one
 - B two
 - C three
 - D It is not possible to determine this.

UNIT 8

Question 26

Below is the painting *Composition 8* by the artist Vasily Kandinsky followed by a quotation from the artist.



‘Colour is the keyboard, the eyes are the hammers, the soul is the piano with many strings. The artist is the hand that plays, touching one key or another purposely, to cause vibrations in the soul.’

(Vasily Kandinsky, *The Effect of Colour*, 1911)

26 The comment by Kandinsky

- A sheds no light on *Composition 8*.
- B reflects the nature of *Composition 8*.
- C describes how *Composition 8* was created.
- D contrasts with the nature of *Composition 8*.

UNIT 9

Questions 27 – 29

Bullying

Where humans can't leave and mustn't complain,
There some will emerge who enjoy giving pain.
A dreary intense groove leads them to each one
they pick to torment, and the rest will then shun.
Some who might have been picked, and natural police, 5
do routine hurt, the catcalling, the giving-no-peace,
but dull brilliance evolves the betrayals and names
that sear dignity and life like interior flames.
Whole circles get enlisted, and blood loyalties reversed
by self-avengers and failures-getting-in-first 10
but this is the eye of fashion. Its sniggering stare
breeds silenced accomplices. Courage proves rare.
This powers revolution; this draws flies to sad pools;
this is the true curriculum of schools.

Les Murray

- 27 The writer suggests that some 'enjoy giving pain' (line 2) because they are
- A insecure.
 - B depressed.
 - C suppressed.
 - D incompetent.
- 28 The writer suggests that bullying is
- A a perversion of nature.
 - B in the nature of things.
 - C a perversion of fashion.
 - D in the nature of institutions.
- 29 The stance of the writer is best described as
- A sympathetic but firm.
 - B impersonal but intense.
 - C personal and introspective.
 - D objective and analytical.

UNIT 10

Questions 30 and 31

In a study, people were first asked to rate how thirsty they were (*not thirsty*, *moderately thirsty* or *very thirsty*). Next, they were given the task of identifying the gender of faces presented on a computer screen. Unknown to them, they were at the same time *subliminally* shown photographs on the screen of happy, angry or neutral faces, to determine if these would act as emotional triggers and influence behaviour.

Immediately after being shown the faces, each person was allowed to drink as much as they wanted of the same unidentified drink, and was asked how much they would be prepared to pay for it. The table presents some of the study's findings.

Subliminal stimulus	Average amount of drink consumed (mL)		
	Very thirsty	Moderately thirsty	Not thirsty
Angry face	12	23	34
Neutral face	29	27	26
Happy face	46	30	20

- *Subliminal* stimuli are presented too quickly for conscious awareness of them.
- Assume the groups were of equal size.

30 Which one of the following hypotheses is best supported by the results?

- A The amount drunk depends just on the level of thirst.
- B People who are relaxed by a happy face drink most even if they are not thirsty.
- C Advertisers should avoid comedy programs if they want to sell drinks.
- D Advertisers should avoid programs depicting anger if they want to sell drinks to thirsty people.

31 Which participants, on average, drank more when exposed to happy faces than when exposed to angry faces?

- A only those who were very thirsty
- B only those who were very thirsty or moderately thirsty
- C only those who were moderately thirsty or not thirsty
- D all participants

UNIT 11

Questions 32 and 33

Consider the following passage and answer the questions accordingly.

Every year, on average, 2400 of the 140 000 Australian deaths are linked to short-term air quality health issues — much more than the 1700 people who die in accidents on our roads. That's an average of a death every four hours.

This estimate is based on the finding reported as follows: 'US studies show that there is a one per cent increase in mortality for every 10 $\mu\text{g}/\text{m}^3$ particulate* pollution'. The US studies indicate there is no 'threshold' below which mortality is not affected.

These conclusions for deaths due to short-term air quality problems are drawn by correlating air quality with deaths caused by bronchitis, asthma and chronic obstructive pulmonary disease.

Deaths due to long-term air quality problems are harder to calculate, but one estimate attributes 1500 deaths to such causes each year in Australia. Causes of these deaths include long-term effects of air toxins in the development of cancer.

Cars are major pollution emitters, but so are bushfires, industrial processes and home heating from wood fires.

While little can be done about bushfire pollution that is not already being tried, there are programs in some areas to subsidise people to shift from wood fires to gas.

* small particles in the air

32 Of the following, the passage most directly indicates that

- A** bushfires cause cancer.
- B** deaths due to air pollution are increasing.
- C** cars are the main cause of death in Australia.
- D** burning gas is less polluting than burning wood.

33 According to the article, which of the following is the best estimate of the total number of deaths each year in Australia that are attributed to air quality?

- A** 1500
- B** 2500
- C** 4000
- D** 5000

UNIT 12

Questions 34 – 38

The following passage from a novel describes a character called Preedy who is on holiday in Spain and goes to the hotel beach for the first time.

But in any case he took care to avoid catching anyone's eye. First of all, he had to make it clear to those potential companions of his holiday that they were of no concern to him whatsoever. He stared through them, round them, over them – eyes lost in space. The beach might have been empty. If by chance a ball was thrown his way, he looked surprised; then let a smile of amusement lighten his face (Kindly Preedy), looked round dazed to see that there were people on the beach, tossed it back with a smile to himself and not a smile at the people, and then resumed carelessly his nonchalant survey of space. 5

But it was time to institute a little parade, the parade of the Ideal Preedy. By devious handlings he gave any who wanted to look a chance to see the title of his book – a Spanish translation of Homer¹, classic thus, but not daring, cosmopolitan too – and then gathered together his beach-wrap and bag into a neat sand-resistant pile (Methodical and Sensible Preedy), rose slowly to stretch at ease his huge frame (Big-Cat Preedy), and then tossed aside his sandals (Carefree Preedy, after all). 10

¹ *Homer*: classic Greek poet

34 Preedy's behaviour in the passage can be best described as

- A confusing.
- B calculating.
- C ambiguous.
- D spontaneous.

35 Which of the titles is most at odds with Preedy's state of mind?

- A Kindly Preedy
- B Ideal Preedy
- C Methodical and Sensible Preedy
- D Carefree Preedy

- 36 Throughout the passage, Preedy's underlying assumption about the people on the beach is that they will
- A condemn him.
 - B find him confusing.
 - C take no interest in him.
 - D be unaware of his inner motivations.
- 37 In the passage as a whole, the writer suggests that Preedy intends to communicate an attitude of
- A interest in the people on the beach.
 - B submission to the people on the beach.
 - C indifference to the people on the beach.
 - D contempt towards the people on the beach.
- 38 Which of the following best describes the attitude of the narrator towards Preedy?
- The narrator's attitude towards Preedy is one of
- A open disgust.
 - B gentle mockery.
 - C irritated impatience.
 - D puzzled uncertainty.

UNIT 13

Questions 39 – 43

Poor water quality at beaches can lead to health problems. To predict the *water quality rating* of a beach for a particular day, five factors are considered: most recent bacterium level, beach quality history, previous day's rainfall, rainfall prediction for the day and cloud cover prediction for the day.

As shown in Table 1, each of the factors is given a score that is weighted (number in **bold**) depending on its importance. The weighted scores are added to give the *water quality score* for the day.

For example, suppose there was no rain on Monday and the bacterium level recorded on that day was 10 organisms/100 mL. Tuesday is predicted to have patchy cloud with no rain. If the beach quality history is Medium, then the water quality score for Tuesday would be

$$0 \times 2 + 0 \times 1 + 1 \times 1 + 0 \times 3 + 1 \times 2 = 3$$

According to Table 2, a water quality score of 3 indicates the water quality rating for this beach on Tuesday is Good.

Table 1

Factor	Criteria	Score	Weighting
Most recent bacterium level (organisms/100 mL)	<36	0	1 , if sampling was done on the previous day 0 , if sampling was done before the previous day
	36–150	1	
	151–500	2	
	>500	3	
Beach quality history (long term)	High	0	2
	Medium	1	
	Low	2	
Previous day's rainfall (mm)	<0.2	0	2
	0.2–2.4	1	
	2.5–4.9	2	
	5.0–9.9	3	
	10.0–19.9	4	
	>20	5	
Rainfall prediction for the day	none	0	3
	drizzle	1	
	showers	2	
	rain	3	
	storms	4	
Cloud cover prediction for the day	none	0	1
	patchy	1	
	cloudy	2	

Table 2

Water quality score	Water quality rating
<10	Good
10–16	Fair
>16	Poor
Bacterium level >500 for the previous two days	Unacceptable

- 39 What is the maximum possible water quality score?
- A 16
 - B 28
 - C 31
 - D 35
- 40 Saturday's rainfall was 22 mm. A cloudy day with showers is predicted for Sunday.
At best, Sunday's predicted water quality rating will be
- A Good.
 - B Fair.
 - C Poor.
 - D Unacceptable.
- 41 On Thursday, the bacterium level for a beach was 165 organisms/100 mL and 6 mm of rain fell. Friday is predicted to be cloudy with showers. The beach quality history is Medium.
What is the predicted water quality score for Friday?
- A 10
 - B 14
 - C 16
 - D 18
- 42 Which of the following would contribute most to the water quality score for a particular day?
- A beach quality history is Low
 - B storms on the previous day
 - C storms predicted for the day
 - D patchy cloud cover predicted for the day

- 43 Which of the following corresponds to a predicted water quality score of 7 for Thursday?

	Wednesday's bacterium level	Beach quality history	Rainfall on Wednesday	Predicted rainfall for Thursday	Predicted cloud cover for Thursday
A	40 orgs/100 mL	Medium	6 mm	drizzle	patchy
B	10 orgs/100 mL	High	6 mm	none	patchy
C	40 orgs/100 mL	High	2 mm	none	none
D	10 orgs/100 mL	Medium	2 mm	drizzle	cloudy

UNIT 14

Questions 44 – 46

The following passage is from a book by an economist named Diane Coyle. It describes some insights into human behaviour that come from combining the disciplines of economics and psychology.

Economists characterise people's behaviour as making choices based on 'maximised expected utility'. This means that we should assess all the information we have and opt for the logical choice. Although we all know from the silly things we do when we're in love or in a panic that this obviously exaggerates human rationality, it seems fair enough as a general proposition that people know best themselves what's in their own interests. 5

Unfortunately, teenage daring poses a problem when it comes to assuming people behave rationally, because so much of what they do clearly is not in their best interests, and at some level even they know that. So, for that matter, does the mid-life crisis¹, driving over the speed limit, or addictive behaviour such as gambling or alcoholism at any age. 10

Psychological studies show that adolescents and adults are very similar in the attitudes they take toward the future consequences of various options. They are on average just as aware of the risks, just as well able to make calculations about complicated future possibilities, and just as disapproving about the negative consequences of drug use or gambling. However, even the most level-headed among us tends to depart systematically from the ideal of rational choice. 15

First, there is a strong human preference for immediate gratification at the expense of future satisfaction. In our psychological make-up we are all what an economist would describe as 'time inconsistent' in our preferences. The outcome we would prefer at every moment between now and the future is not what we would prefer when we finally get to the future. 20

The second systematic departure from rational choice is that many people are very bad at predicting how they will feel about different outcomes in the future. It is impossible when you are young to appreciate that you might prefer different things when you are older: that a steady job and a nice home will seem more appealing than hanging around at the shopping centre with your friends. It's called a 'projection bias' in people's preferences. We were all like that once. 25

¹ *mid-life crisis*: a period of psychological stress occurring in middle age

44 Which of the following quotes is closest to the view of young people presented in the final paragraph?

- A** Youth is wasted on the young.
- B** Young people need models, not critics.
- C** You cannot put an old head on young shoulders.
- D** You are only young once, and if you work it right, once is enough.

45 'Projection bias' may help economists to understand

- A** the choices that people make.
- B** how we might feel in the future.
- C** the predominance of rational behaviour.
- D** what the outcome of a preference may be.

46 The passage describes an association between economics and psychology which is

- A** equable.
- B** a rivalry.
- C** incompatible.
- D** complementary.

UNIT 15

Questions 47 – 51

The lower a person's bone density, the greater their risk of bone fractures. Table 1 gives the average (mean) bone density (BD) of men and women of various ages in two countries, C1 and C2. Mean BD values for people aged 20, 30, 40, 50, 60, 70 and 80 are given in BD units, together with the standard deviation* (SD) for the group.

*The SD is a measure of the spread of BD values in a group. Typically, two-thirds of all people in a group will have a BD measurement within 1 SD of the mean (for example, two-thirds of 30-year-old C1 women have a BD between 820 and 1080 units).

Table 1

Mean BD and value of 1 SD (BD units)								
Age	C1 Women		C2 Women		C1 Men		C2 Men	
	Mean BD	1 SD	Mean BD	1 SD	Mean BD	1 SD	Mean BD	1 SD
20	970	120	1050	120	1060	140	1190	170
30	950	130	1000	150	1040	140	1150	160
40	900	130	1000	160	1000	140	1090	160
50	870	140	970	160	990	140	1070	180
60	810	140	890	150	970	150	1030	170
70	740	140	840	150	930	150	980	170
80	670	140	720	140	860	160	930	190

To predict their risk of bone fracture, a person's BD is measured and compared to a *standard* BD to give either a T-score or a Z-score. These scores are indications of how many standard deviations a person's BD is from the mean of a standard group and are calculated using the following equation.

$$\text{T-score or Z-score} = \frac{\text{person's BD} - \text{standard BD}}{1 \text{ SD}}$$

- For the T-score, the standard BD is the mean BD of 30-year-olds of the same sex and country, and the SD is that for 30-year-olds of the same sex and country.
- For the Z-score, the standard BD is the mean BD of people of the same age, sex and country, and the SD is that for people of the same age, sex and country.

T-scores are used to describe bone health status and are interpreted as follows:

Table 2

T-Score	Bone health status
above –1.0	Normal
between –1.0 and –2.5	Osteopenia (low bone density)
between –2.5 and –3.5	Osteoporosis (very low bone density)
below –3.5	SEO (severe low bone density)

Assume that the SDs given in Table 1 apply to T-score and Z-score distributions as described.

- 47 Which of the following is the best estimate of the BD of a 40-year-old C2 female who is diagnosed as having Osteoporosis?
- A 350 units
 - B 450 units
 - C 550 units
 - D 650 units
- 48 Which of the following are the best estimates of the T-score and Z-score values for a 70-year-old C2 man with a BD of 1050 units?
- A T-score = -0.6 , Z-score = 0.4
 - B T-score = 0.6 , Z-score = -0.4
 - C T-score = -0.4 , Z-score = 0.6
 - D T-score = 0.4 , Z-score = -0.6
- 49 Of the following, the best estimate of the BD of a 60-year-old C1 woman with a T-score of -2.5 is
- A 350 units.
 - B 450 units.
 - C 600 units.
 - D 700 units.
- 50 Alex is an 80-year-old C2 man with a Z-score of -0.5 .
His bone health status is
- A Normal.
 - B Osteopenia.
 - C Osteoporosis.
 - D SEO.
- 51 To determine if a person has a lower bone density than expected for their age it would be best to use
- A the T-score.
 - B the Z-score.
 - C both scores equally.
 - D neither score.

UNIT 16

Questions 52 – 55

Several approaches have been used to explain and justify the belief in human rights.

Biological theories

see human rights as arising from the reproductive advantage of human social behaviour, and based on concern for other people in the race to continue the species.

Social contract theories

claim that individuals in a society accept rules in exchange for security and economic advantage.

Natural law theories

base human rights on the view that there is a natural moral order of objectively valid prescriptions.

Supernatural law theories

see human rights as based on the law of God as presented in such religious texts as the Bible and Qur'an.

Humanist theories

see human rights as based on universally applicable values.

Interest theories

claim that human rights are justifiable on the grounds of their value in creating the necessary conditions for human well-being. Some Interest theorists also justify human rights on grounds of self-interest (rather than concern for others). Respecting the rights of others ensures that one's own will be protected.

52 Which one of the following is best described as a practical rather than a moral kind of theory?

- A** Interest theories
- B** Humanist theories
- C** Natural law theories
- D** Supernatural law theories

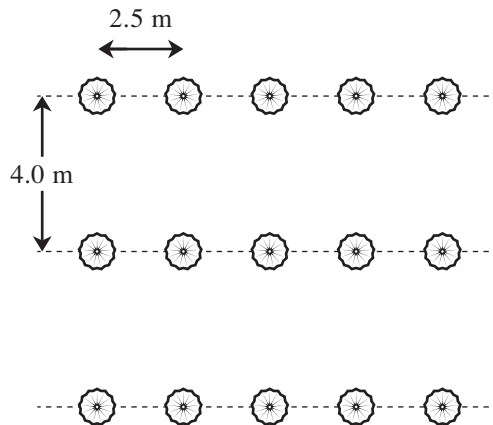
- 53** Describing human rights as a 'contract' suggests that human rights
- A** cannot be cancelled.
 - B** have a moral but not a legal force.
 - C** have a moral force above the law.
 - D** are an agreement that has the force of law.
- 54** Describing human rights as a law suggests they are
- A** enforceable.
 - B** an agreement.
 - C** a matter of choice.
 - D** a moral requirement.
- 55** Which of the following pairs of human rights theories have the most in common?
- A** Humanist theories and Biological theories
 - B** Biological theories and Supernatural law theories
 - C** Interest theories and Biological theories
 - D** Supernatural theories and Interest theories

UNIT 17

Questions 56 – 59

On a beach, umbrellas are placed at precise locations to protect people from the sun. The umbrellas are arranged in straight, equally spaced, parallel rows. Each umbrella is placed in a hole in the sand. As indicated in the figure below, adjacent holes in a row are 2.5 metres apart and adjacent rows are 4.0 metres apart.

People can hire the umbrellas for \$10 per half-day, or \$15 per day.



Assume that:

- umbrellas are 1.0 metre in diameter;
- umbrellas are precisely upright;
- when viewed from above, the hole is at the centre of the umbrella;
- the length of a row is the distance between the centres of the umbrellas at the extreme ends of the row (where the distance between adjacent holes in a row is 2.5 metres); and
- the width of a set of parallel rows is the distance between the rows that are furthest apart (where the distance between adjacent rows is 4.0 metres).

56 How much would be charged for the hire of a row of beach umbrellas 15 metres long for half a day?

- A** \$60
- B** \$65
- C** \$70
- D** \$80

57 If there were 10 rows, each 50 metres long, how many umbrella holes would there be?

- A** 210
- B** 200
- C** 82
- D** 80

- 58** Which one of the following is a formula for determining how many beach umbrellas can be placed in a single row of a given length, L (where L is a multiple of 2.5)?

A $\frac{L}{2.5 - 1}$

B $\frac{L}{2.5 + 1}$

C $\frac{L}{2.5} + 1$

D $\frac{L}{2.5} + \frac{L}{2.5 - 1}$

- 59** In one day, what is the most that could be charged for the hire of beach umbrellas in two parallel rows each 12.5 metres long?

A \$90

B \$120

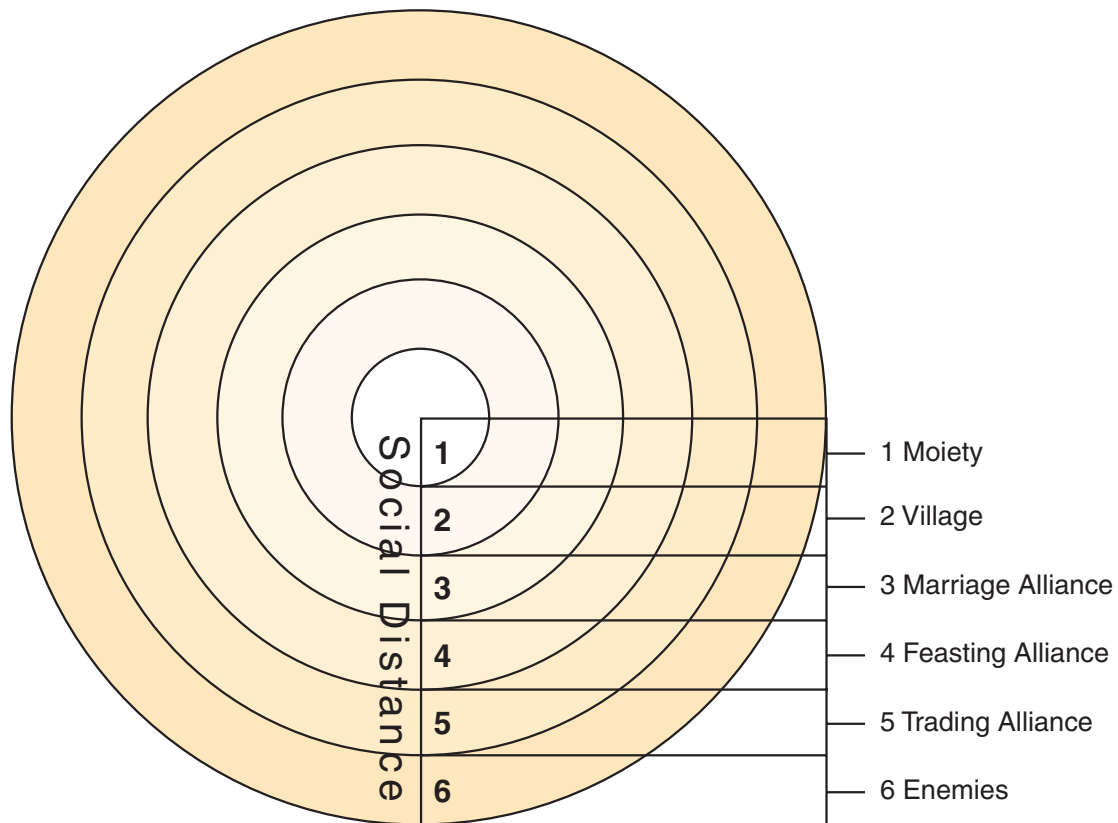
C \$180

D \$240

UNIT 18

Questions 60 – 63

The diagram below was designed to represent the intergroup relations and social distance among the Yanomamo people of the Amazon jungle.



Levels of social distance

- 1 Moiety — a form of social organisation in which people are divided into two categories (moieties) according to their father's line of descent. People are forbidden from marrying members of their own moiety.
- 2 Village — a settlement composed of people from the two moiety groups.
- 3 Marriage Alliance — people usually marry within their own village, but a village may form an alliance with another village by giving them a wife.
- 4 Feasting Alliance — as a way of maintaining peaceful relations, one village may invite another to a feast. Whilst this relationship is in effect, the two villages will refrain from attacking each other and may create an alliance against a common enemy.
- 5 Trading Alliance — groups who are at peace with one another, but not friendly enough to allow feasting or intermarriage may trade mutually advantageous items in order to prevent hostilities.
- 6 Enemies — groups that fall outside of any kind of alliance and maintain a constant state of war usually associated with seizures of each other's women.

- 60 The moiety rules relating to marriage provide a way of
- A controlling population growth.
 - B preventing inheritance disputes.
 - C ensuring a degree of genetic diversity.
 - D promoting friendly relations between villages.
- 61 The diagram suggests that in Yanomamo society a marriage partner may be selected from
- A level one only.
 - B level two only.
 - C usually level two and in some circumstances level three.
 - D usually level three and in some circumstances level two.

Questions 62 and 63 relate to both the diagram and the following comment from an expert in Yanomamo culture.

‘Intergroup relations tend to shift through stages of hostility, irregular trading, feasting, marriage exchange and common settlement. Reversal can occur at any point in this sequence and set both parties back on a path to war.’

- 62 The above comment indicates that social distance in Yanomamo society is
- A dynamic.
 - B improving.
 - C predictable.
 - D deteriorating.
- 63 A successful level 4 relationship between two Yanomamo groups could lead directly to
- A irregular trading.
 - B common settlement.
 - C marriage exchanges.
 - D military confrontation.

UNIT 19

Questions 64 – 68

The level of certain chemicals in chlorinated swimming pools needs to be kept within certain ranges in order to keep the water *balanced*. Balanced pool water has a *Saturation Index (SI)* between -0.5 and $+0.5$, and satisfies the following equation:

$$SI = pH + TF + CF + AF - 12.1,$$

where

- **pH** is a measure of the acidity of the water
- **TF** is the temperature factor
- **CF** is the calcium factor
- **AF** is the alkalinity factor.

To test whether water is balanced, a sample is taken and the temperature, **pH**, amount of calcium carbonate (parts per million, ppm) and total alkalinity (**TA**) (ppm) are measured.

From these measurements, **TF**, **CF** and **AF** can be determined using the following tables. For example, if the water temperature is 24°C , **TF** is 0.6 .

Table 1

water temperature (°C)	TF
0	0.0
3	0.1
8	0.2
12	0.3
16	0.4
19	0.5
24	0.6
29	0.7
34	0.8
40	0.9

Table 2

calcium carbonate (ppm)	CF
5	0.3
25	1.0
50	1.3
75	1.5
100	1.6
150	1.8
200	1.9
300	2.1
400	2.2

Table 3

TA (ppm)	AF
5	0.7
25	1.4
50	1.7
75	1.9
100	2.0
150	2.2
200	2.3
300	2.5
400	2.6

Experts have also determined optimum ranges for **pH**, calcium carbonate and **TA**, and these are shown in Table 4.

Table 4

	optimum range
pH	7.2–7.8
calcium carbonate (ppm)	75–150
TA (ppm)	100–150

- 64 A pool with a temperature of 34 °C, **pH** 7.5, calcium carbonate 75 ppm and **TA** 150 ppm is
- A balanced with an **SI** of -0.1 .
 - B balanced with an **SI** of 0 .
 - C unbalanced with an **SI** below -0.5 .
 - D unbalanced with an **SI** above +0.5 .
- 65 Suppose pool water has a temperature of 29 °C and calcium carbonate and **TA** both in the range 75–150 ppm.
- Of the following, which **pH** range will **always** balance the water?
- A 7.0–7.2
 - B 7.2–7.4
 - C 7.6–7.8
 - D 8.0–8.2
- 66 What is the **pH** if **SI** is 0.3, **TF** is 0.5, **CF** is 1.6 and **AF** is 2.2?
- A 2.5
 - B 7.5
 - C 7.8
 - D 8.1
- 67 Provided the calcium carbonate and total alkalinity levels are equal, what is the relationship between **CF** and **AF**?
- A $\text{CF} = \text{AF} + 0.4$
 - B $\text{AF} = \text{CF} + 0.4$
 - C $\text{CF} = 2 \times \text{AF} + 0.1$
 - D $\text{AF} = 2 \times \text{CF} + 0.1$
- 68 Pool water with a temperature of 24 °C and **pH** 7.2 can
- A be balanced if calcium carbonate and **TA** are each 150 ppm.
 - B be balanced if calcium carbonate is 150 ppm and **TA** is 75 ppm.
 - C never be balanced if calcium carbonate and **TA** are in the optimum ranges.
 - D always be balanced if calcium carbonate and **TA** are in the optimum ranges.

UNIT 20

Questions 69 – 73

Figure 1 presents a model of costs (dashed red line) and benefits (thin, solid green line) for a bird defending its territory. Included is a net benefits line (bold, solid orange line) with an optimum defended territory size (T_{opt}) indicated. Arbitrary standard units are used for territory size.

Figure 2 presents a variant of the model, which assumes a minimum defended territory size requirement of 3 units to enable a suitable nest site to be found and maintained. The figure gives lines for a high benefits situation (for example, good seasonal rainfall) and a low benefits situation (for example, poor seasonal rainfall) together with net benefits lines.

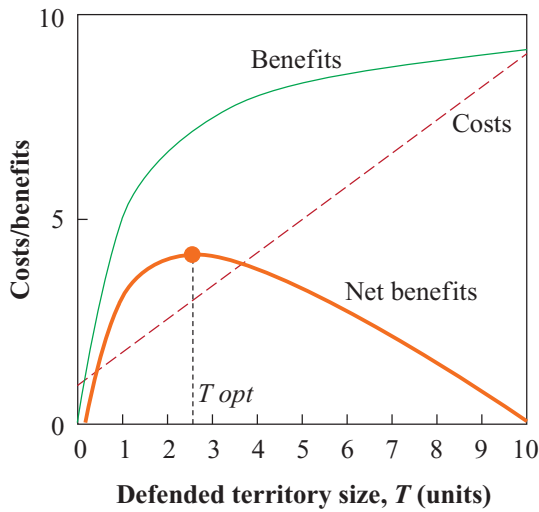


Figure 1

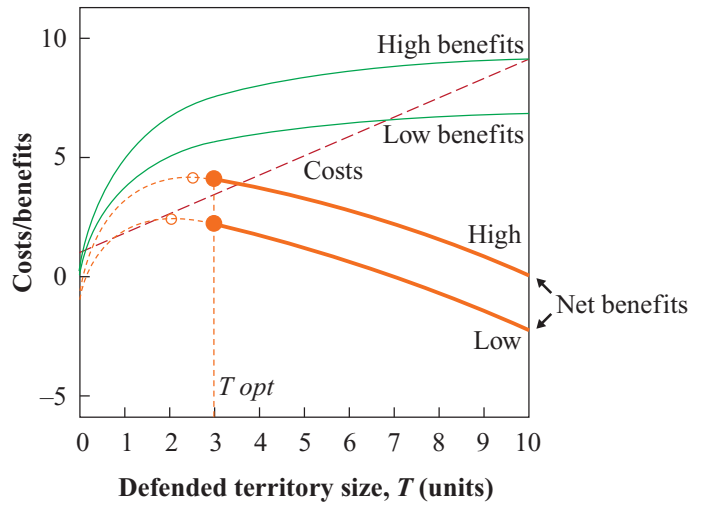


Figure 2

The benefits line is determined from the following equation, where f represents *efficiency of foraging for food* and T represents *defended territory size*.

$$\text{benefits} = f - \frac{f}{T+1}$$

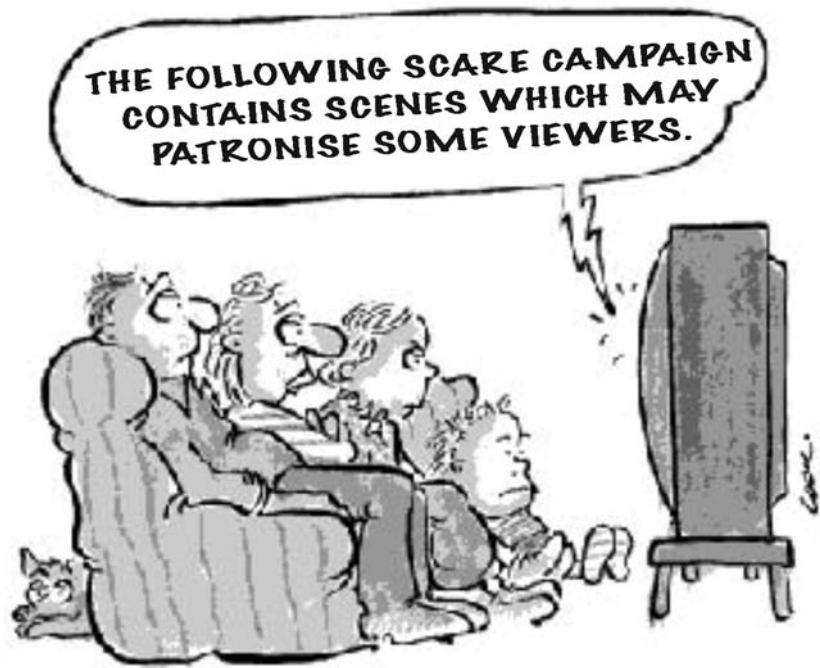
The costs line is determined from the following equation, where m is the *energy needed for basic function*, d is *defence effectiveness* and q is related to *level of competition*.

$$\text{costs} = m + \frac{qT}{d}$$

- 69 Costs would decrease if just
- A d decreases.
 - B q decreases.
 - C f increases.
 - D m increases.
- 70 The net benefits line in Figure 1 has the shape shown because it equals
- A T minus T_{opt} .
 - B T_{opt} minus T .
 - C costs minus benefits.
 - D benefits minus costs.
- 71 T_{opt} in Figure 2 represents the point where
- A benefits minus costs is greatest for an acceptable defended territory size.
 - B benefits minus costs is zero for an acceptable defended territory size.
 - C defended territory size is greatest when benefits minus costs is positive.
 - D defended territory size is greatest when benefits equals costs.
- 72 For Figure 2, if defended territory size was 5 units rather than 3 units, net benefits would be
- A less because costs rise faster than benefits.
 - B more because costs rise faster than benefits.
 - C less because costs rise more slowly than benefits.
 - D more because costs rise more slowly than benefits.
- 73 According to Figure 2, in a low benefits environment, which of the following defended territory sizes is the smallest needed to make net benefits negative?
- A 3 units
 - B 4 units
 - C 6 units
 - D 8 units

UNIT 21

Question 74



- 74 The cartoon is a joke about the
- A censorship of media campaigns.
 - B media's attitude to the viewing public.
 - C physical fitness of the viewing audience.
 - D media's failure to manipulate the viewing public.

UNIT 22

Questions 75 – 77

The passage below is from the preface of a book by the economist, John Maynard Keynes, published in 1935.

This book is chiefly addressed to my fellow economists. I hope that it will be intelligible to others. But its main purpose is to deal with difficult questions of theory, and only in the second place with the applications of this theory to practice. For if orthodox economics is at fault, the error is to be found not in the superstructure¹, which has been erected with great care for logical consistency, but in a lack of clearness and of generality in the premises. Thus I cannot achieve my object of persuading economists to re-examine critically certain of their basic assumptions except by a highly abstract argument and also by much controversy. I wish there could have been less of the latter. But I have thought it important, not only to explain my own point of view, but also to show in what respects it departs from the prevailing theory. Those, who are strongly wedded to what I shall call ‘the classical theory’, will fluctuate, I expect, between a belief that I am quite wrong and a belief that I am saying nothing new. It is for others to determine if either of these or the third alternative is right. My controversial passages are aimed at providing some material for an answer; and I must ask forgiveness if, in the pursuit of sharp distinctions, my controversy is itself too keen. I myself held with conviction for many years the theories which I now attack, and I am not, I think, ignorant of their strong points.

¹ *superstructure*: any material structure or edifice built on something else; that which is raised on a foundation or base

- 75 In his book, Keynes aimed to
- A challenge fundamental economic principles.
 - B create controversy over new economic theories.
 - C reassess the practical details of economic theory.
 - D reinforce existing economic theories and practices.
- 76 The ‘others’ (line 2) to whom Keynes refers are
- A people who are ignorant of classical theory.
 - B controversial economists.
 - C classical economists.
 - D the general public.
- 77 Keynes believes he is in a good position to judge existing economic theories because
- A he is famous and controversial.
 - B he believes his assumptions are accurate.
 - C he understands theories he now discredits.
 - D his unorthodox economic theory has caused debate.

UNIT 23

Questions 78 – 80

The two passages below are about ‘Girl with a Pearl Earring’ (on the opposite page) painted by a Dutch artist, Johannes Vermeer in 1665–6. In order to answer the questions, you may need to refer to one, two or all three pieces of the material.

Passage I was written by an art critic and published in the catalogue for a Vermeer exhibition in 1996.

PASSAGE I

As this young girl stares out at the viewer with liquid eyes and parted mouth, she radiates purity, captivating all who gaze upon her. Her soft, smooth skin is as unblemished as the surface of her large, teardrop-shaped pearl earring. Like a vision emanating from the darkness, she belongs to no specific time or place. Her exotic turban, wrapping her head in crystalline blue, is surmounted by a striking yellow fabric that falls dramatically behind her shoulder, lending an air of mystery to the image.

Passage II is from the novel ‘Girl with a Pearl Earring’, written from the point of view of ‘Griet’, the fictional name given to the girl depicted in the painting.

PASSAGE II

The painting was like none of his others. It was just of me, of my head and shoulders, with no tables or curtains, no windows or powderbrushes to soften and distract. He had painted me with my eyes wide, the light falling across my face but the left side of me in shadow. I was wearing blue and yellow and brown. The cloth wound round my head made me look not like myself, but like Griet from another town, even from another country altogether. The background was black, making me appear very much alone, although I was clearly looking at someone. I seemed to be waiting for something I did not think would ever happen.



- 78 Passage I is mainly concerned with
- A the impact of the painting.
 - B Vermeer's approach to painting.
 - C Vermeer's relationship to the girl.
 - D the historical setting of the painting.
- 79 Both passages give an impression that the subject of the painting was
- A a famous identity.
 - B typical for this artist.
 - C depicted without context.
 - D symbolic of 17th century Dutch life.
- 80 Of the following word pairs, which best represents the contribution made by the painting's background, as described in each passage?

	Passage I	Passage II
A	uniqueness	hopefulness
B	universality	solitariness
C	solitariness	universality
D	agelessness	youthfulness

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