



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Subsidiary Level and Advanced Level

THINKING SKILLS

9694/01

Paper 1 Problem Solving and Critical Thinking

For Examination from 2009

SPECIMEN MARK SCHEME

1 hour and 30 minutes

MAXIMUM MARK: 30

This document consists of **17** printed pages and **1** blank page.



<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	D	16	D
2	D	17	A
3	E	18	E
4	D	19	B
5	C	20	C
6	A	21	C
7	C	22	D
8	A	23	A
9	C	24	A
10	E	25	D
11	C	26	B
12	D	27	B
13	C	28	E
14	B	29	A
15	B	30	B

1 Children's bricks

Justification

The key is **D**.

The 10 cm dimension of the brick will fit twice into the 20 cm dimension of the box.
 The 5 cm dimension of the brick will fit 5 times into the 25 cm dimension of the box.
 The 2 cm dimension of the brick will fit twice into the 4 cm dimension of the box.

The total number is $2 \times 5 \times 2 = 20$. This fills the box completely so no other arrangement can do better.

Distractors

- A** This fits the bricks in as $2 \times 2 \times 2$ or $4 \times 2 \times 1$, failing to observe that the 5 cm dimension will fit into either the 25 or 20 cm dimension at least 4 times.
- B** 2×5 . This fails to notice that the blocks can be fitted in 2 deep and considers the fitting as a 2 dimensional problem only.
- C** $4 \times 2 \times 2$. This fits the 10 cm dimension of the brick twice into the 25 cm dimension of the box, the 5 cm dimension of the brick 4 times into the 20 cm dimension of the box and the 2 cm dimension of the brick twice into the 4 cm dimension of the box. It leaves some spare space and is not optimal.
- E** $10 \times 5 \times 2$. Takes the bricks as $5 \times 2 \times 2$ cm, failing to note the 10 cm dimension.

2 Industrialised Countries

Justification

The key is **D**.

This graph correctly represents the data in the table.

Distractors

- A** In the 16–59 group the bar for the more industrialised countries is lower than that for the more industrialised countries, the relative sizes should be 60 and 40 respectively. The last two bars are much too high and the third pair too low.
- B** As for **A** with the last two bars switched over.
- C** The last two pairs of bars have the more/less industrialised countries switched around.
- E** The first two pairs of bars have the more/less industrialised countries switched around.

3 Cars and Dishwashers

Justification

The key is **E**.

Since 80% of households own a car, 20% do not own a car. Of the 40% owning a dishwasher, only half at maximum (20% of households) could not own a car, so at least 20% or 1 in 5 must own both.

Distractors

- A** Since 40% own a dishwasher, 60% do not own a dishwasher. This 60% could completely overlap with the 80% owning a car, so it is possible that three-quarters of car owners do not have a dishwasher.
- B** The 40% owning a dishwasher could coincide completely with half of the 80% owning a car, in which case 20% of the total could own neither.
- C** If the 60% of households without a dishwasher all have cars, then only 20% of the total would have both. This is exactly half of those with a dishwasher, not the majority.
- D** 20% of households do not have a car. If this 20% have dishwashers then all households would have one or the other or both.

4 Leaflets

Justification

The key is **D**.

The maximum weight is 60 g. The envelope weighs 10 g, leaving 50 g for leaflets. The maximum number of leaflets occurs when they all weigh the minimum, or 2 g. In this case $50 \div 2$ or 25 leaflets could be put in one envelope.

The skills are data extraction and processing, although the processing is quite simple once the relevant information has been found. There is no procedure to find as this is clear and straightforward.

Distractors

- A** If the maximum leaflet weight is used in the calculation rather than the minimum, the number of leaflets is $50 \div 3$ or a maximum of 16. This is, in fact, the minimum number of leaflets which could just be fitted in.
- B** This uses the average weight instead of the minimum: $50 \div 2.5 = 20$.
- C** This erroneously assumes that the weight must be less than 60 g and cannot be exactly 60 g. In this case only 24 can be inserted as the 25th would make exactly 60 g.
- E** This forgets the weight of the envelope and calculates the number as $60 \div 2 = 30$.

5 Soft Drinks**Justification**

The key is **C**.

The 'Yes' response is half of the total and the 'No' response is 1 ½ times the 'Unsure'. **C** is the only answer which is sufficiently close to this.

Distractors

- A** The 'Yes' response is more than half of the total (600/1100).
- B** The 'Yes' response is more than half the total (1000/1800).
- D** The 'No' and 'Unsure' responses are too similar.
- E** The 'No' and 'Unsure' responses are the same so would each be ¼ of the pie chart.

6 Qualifications**Justification**

The key is **A**.

The conclusion is that, where a group is under-represented at work, the next vacancy should go to someone from that group, and not necessarily the most qualified person. The grounds are that this is in the interest of social harmony. **A** adds another line of reasoning: that the most qualified may not be the most suitable, and hence strongly supports the conclusion.

Distractors

- B** This misses the point. The argument is that qualifications should not be the deciding factor.
- C** This weakens the argument.
- D** This is not central to the argument.
- E** This weakens the argument.

7 Crime

Justification

The key is **C**.

If the explanation for the lack of crime is that the islanders are not the compulsive criminals they are reputed to be, then the other possible explanation – that the police are more competent than everyone says – has to be excluded. **C** does this.

Distractors

- A** The argument is based on crimes committed not crimes reported, so the distinction is irrelevant.
- B** Not relevant because the argument is specifically about crimes against tourists.
- D** This has no bearing on the argument.
- E** This is not assumed as it would weaken the argument.

8 Wearing Glasses

Justification

The key is **A**.

If politicians do gain from projecting the image of confidence and composure and wearing glasses could give them this, then it follows that they could gain from wearing glasses. **A** states this.

Distractors

- B** There is nothing in the passage to suggest that people need their leaders to be capable etc.
- C** There is no link implied between wearing glasses and popularity as such.
- D** This is too general.
- E** The passage claims that some politicians may gain composure from wearing glasses, but it does not follow from that that those who don't wear glasses lack composure.

9 Glass

Justification

The key is **C**.

The argument goes too far in claiming that my inability to predict an outcome means it has no cause. The most that follows from the argument is that I don't know its cause. **C** identifies this fallacious claim. None of the others identifies claims made in the passage.

Distractors

- A** The argument does conclude that I know the cause from my ability to predict.
- B** There is no claim that any event is certain to happen because its cause is known.
- D** This would be a flaw if the argument drew such a conclusion, but it does not.
- E** There is no suggestion in the argument that unexplained events can't happen: the claim is that unpredictable events have no cause.

10 Violence against judges

Justification

The key is **E**.

The passage clearly indicates that judges are in increasing danger of attack, especially in their offices. From this it follows that they should be given more protection, especially where they have least. **E** makes this recommendation. The others all stray beyond what is stated or implied by the passage.

Distractors

- A** There is no suggestion that people on trial are not treated with compassion.
- B** This is nowhere implied in the passage: protection is recommended for judges, not for the general public.
- C** This may be so, but it does not follow from claims about the lack of protection given to judges.
- D** If anything, the opposite is implied: that judges regularly have a calming influence.

11 Travelling

Justification

The key is **C**.

The distance north and east of Fred that Lucy is can be calculated by subtracting their travel distances in the appropriate directions.

Fred must travel $(6 - 3) = 3$ km north and $(8 - 4) = 4$ km east.

His journey distance must, therefore be between 4 km (the diagonal distance must be more than the longest north or east distance) but less than 7 km (the diagonal distance must be less than the sum of the north and east distances). **C** is correct.

Distractors

- A** 3 km is the distances he is south of Lucy, he must travel more than this as he is also some distance to the west.
- B** This lies between the distances he is south and east of Lucy. The diagonal distance must be greater than both.
- D** This is the distance he would have to travel if he went due north then due east, not by the direct straight route.
- E** This is greater than the sum of the distances north and east he has to travel. The straight diagonal route must be less than 7 km.

12 Paved Area

Justification

The key is **D**.

The easiest way to approach this question is to appreciate that the perimeter is equal to that of a rectangle enclosing the park (the cut-off corners are the same length as the rectangle corners). This has sides $(20 + 50)$ and $(60 + 30)$ or 70 and 90 m. The perimeter is $2 \times (70 + 90) = 320$ m.

Distractors

- A** This adds the two sides but forgets to multiply by 2.
- B** Takes the two sides as $(60 + 30)$ and $(50 - 20)$. Perimeter would be $2 \times (90 + 30) = 240$.
- C** Takes the two sides as $(50 + 20)$ (correct) and 60 (forgets corner). Perimeter would be $2 \times (70 + 60) = 260$.
- E** Adds the 30 twice 50 to get sides of $(60 + 30)$ (correct) and $(50 + 30 + 30)$. The perimeter would be $2 \times (90 + 110) = 400$ m.

13 Photocopying

Justification

The key is **C**.

The copies can be made as 86/87, 88/89, 90/91, ...122/123. The number of copies is one more than the difference between starting and finishing page numbers, divided by 2. $(123 - 86 + 1) \div 2 = 19$.

Distractors

- A** This takes the difference between the numbers of pages, divides by two, rounds down and subtracts one. All the rounding operations are in the wrong direction.
- B** This subtracts one from the difference between the number of pages and divides by two. The wrong calculation procedure has been derived.
- D** This take one extra page thinking that either the starting or finishing page cannot be photocopied in the same double-spread as another required page.
- E** As for **D** but takes extras for both starting and finishing pages.

14 Time

Justification

The key is **B**.

On the 1 April, both countries have put their clocks forward, so the Netherlands is 1 hour ahead of Britain. When it is 9 o'clock in the Netherlands, it is 8 o'clock in Britain.

Distractors

- A** If the Netherlands had put the clocks forward, but Britain had not (this situation never exists), the Netherlands would be two hours ahead of Britain, so it would be 7 o'clock in Britain when it was 9 o'clock in the Netherlands.
- C** If Britain had put the clocks forward but the Netherlands had not (as is the case from 15 to 31 March), the two countries would be on the same time.
- D** This counts the hour difference in the wrong direction, adding one hour to get British time, rather than subtracting.
- E** This combines the errors made in **C** and **D** to get an overall 3 hour error.

15 Shrubs

Justification

The key is **B**.

The maximum number of gaps between shrubs is $11 \div 1.6$ rounded down or 6, giving 7 shrubs. These occupy $6 \times 1.6 = 9.6$ m, leaving 1.4 m in total or 0.7 m at each end.

Distractors

- A** Correctly calculates 7 shrubs but multiplies this by 1.6 to get 11.2 m and looks at the difference between this and 11 m which is 0.2 m, leaving 0.1 m at either end.
- C** As the shrubs are 1.6 m apart, assumes the gap at the ends must be half of this or 0.8 m.
- D** Calculates the gaps correctly but forgets to divide the surplus by 2: $11 - 9.6 = 1.4$ m
- E** Thinks that as $11 \div 1.6$ rounded down is 6, there will be a maximum of 5 gaps or 8 m in total, leaving a surplus of 3 m, half at each end or 1.5 m.

16 Queuing

Justification

The key is **D**.

The passage links queuing with cooperation, and explains cooperation among humans in terms of long term benefit. But it does not explain why other animals do not cooperate and queue. Only **D** provides an explanation for this by introducing rationality as a uniquely human factor, and as a requirement for recognising long term benefit.

Distractors

- A** This simply echoes one of the claims in the passage, rather than explaining it.
- B** This may be taken as a consequence of the argument; it is not an explanation.
- C** Like **A**, this just repeats part of the passage without offering explanation of any kind.
- E** This does not explain why only humans cooperate with strangers; in fact it confuses the issue.

17 Pesticides**Justification**

The key is **A**.

The argument makes the general point that we should not destroy species just because they are enemies, and gives examples. It supports this intermediate conclusion by claiming that destroying such species would harm the environment we all rely on. From this reasoning, the first sentence – that it would be wrong to wipe out mosquitoes – follows as a further instance. **A** identifies this conclusion.

Distractors

- B** This is the intermediate conclusion.
- C** This is a supporting reason.
- D** This is a supporting reason.
- E** This contradicts the implied claim that mosquitoes are natural enemies

18 Stealing**Justification**

The key is **E**.

The argument tries to argue that if Sam had spent a lot on clothes, that might have been a reason to suspect her of stealing. However, the fact that she didn't spend a lot does not mean she did not steal, and the assumption that it does is what is wrong with the reasoning.

Distractors

- A** The argument does not assume this. Whether Sam needed to steal or not does not enter into the argument.
- B** Sam's denial is not the reason given for concluding she is innocent: lack of spending is the reason.
- C** No such assumption is made. Even if Sam had bought clothes it would not have meant she had stolen to do so, it would simply have been grounds for suspicion.
- D** As with **C**, there is no implication that in general extravagance is evidence of stealing.

19 Handbag stolen

Justification

The key is **B**.

The main premise for the conclusion that the insurers will have to pay up is that the bag was snatched from Asha's person. For this to be a sufficient condition, it must be assumed that thefts from the person are covered.

Distractors

- A** This is loosely implied, but is not required for the conclusion to follow. This argument is about a theft from a car that was unlocked.
- C** This is a big generalisation and is not needed for this argument about a specific insurance company/policy. Some insurers may cover thefts from unlocked cars.
- D** No assumptions about right or wrong are required for this argument.
- E** It is irrelevant whether or not Asha read the small print. Even if she had read it, she would still, arguably, have a valid claim, because the theft was from her person.

20 Chemicals

Justification

The key is **C**.

It would not be possible to accept this argument if we did not have some idea of what constitutes a good reason, as opposed to any reason. If 'good reason' meant evidence of serious resulting illness, then the argument is a strong one. If it meant any kind of general anxiety, it would be far weaker. Therefore the term is in need of clarification.

Distractors

- A** This is incidental, because the argument is that we should not wait for further research, whatever form it takes.
- B** It is sufficient for the argument that large numbers of chemicals have been released, and 'thousands' satisfies this condition.
- D** Like **A**, this is incidental to the main argument.
- E** So is this: the argument is the same whichever industry uses the chemicals, so it does not need specifying.

21 Ladders

Justification

The key is **C**.

The options for a ladder of the correct length (over 8 m extended) are the longest two triple section or longest three double section ladders. All three of the double section ones are over 4.2 m long so will not fit in the garage. The shorter of the two triple section ladders will do, the lowest price is for the lightweight version or £133.

Distractors

- A** This is the price of the longest double section ladder which will fit into the garage. It is, however, only 7.2 m long so will not reach the gutter.
- B** This is the price of the shortest double section ladder which is long enough to reach the gutter. It is, however, too long when closed to fit in the garage.
- D** This is the correct selection of ladder size, but opts for the heavyweight which is more expensive than the lightweight type.
- E** This is the longest three section ladder which will fit into the garage. When open it is longer than necessary and is only available in a heavyweight version.

22 Hand painted Cards

Justification

The key is **D**.

The cost of labour per card is $5 \text{ (min)} \div 60 \text{ (1 hour)} \times £6 = 50\text{p}$. The total manufacturing cost is $20\text{p (materials)} + 50\text{p (labour)} = 70\text{p}$. She adds 50% to this so her selling price is $1.5 \times 70\text{p} = £1.05$.

Distractors

- A** This is just the material price plus 50%: $20 \times 1.5 = 30\text{p}$. It forgets the labour cost.
- B** This is the material plus labour cost ($20 + 50 = 70\text{p}$). It forgets to add on the 50% selling cost.
- C** This adds the 50% mark up only to the labour cost, not to the materials cost: $20\text{p} + 1.5 \times 50\text{p} = 95\text{p}$.
- D** This calculates the production cost as £1.20, doubling the cost of labour before adding the 50% mark up.

23 Chocolate chip ice cream

Justification

The key is **A**.

There are $10 \times 36 = 360$ ice creams in the shop. These will last for $360 \div 75$ or 4 weeks (rounded down). The new order must be placed two weeks before this to allow for delivery time, i.e. in two weeks time.

Distractors

- B** This rounds up, rather than rounding down the number of weeks left. 5 weeks supply – 2 weeks delivery = 3 weeks.
- C** This forgets the delivery time and is the number of whole week's stock left.
- D** This is the same as **C** but forgetting the delivery time.
- E** This calculates the remaining stock usage correctly but adds instead of subtracting the delivery time: $4 + 2 = 6$.

24 Racing

Justification

The key is **A**.

As the horizontal axis is time, Linford started at 10 seconds and stopped at 60 seconds, he ran for 50 seconds. This is the only one of the conclusions which can be drawn.

Distractors

- B** The graph shows that their speeds were the same after 20 seconds, not their distance run.
- C** Linford was 10 seconds behind Sally when he began to run. One can not conclude from the graph that Sally's average speed for this time was 1 m/s so one can also not conclude that she was 10 m ahead.
- D** Under the conditions given, Linford was doing press-ups. This was not a bad start.
- E** The difference in speed stayed the same during the latter part of the race. Linford was going faster so he was, in fact, either catching Sally up or getting further ahead of her.

25 Cat drugs**Justification:**

The key is **D**.

Area **D** represents the conditions given. This is the area between the 5 and 10 mg lines on the vertical axis and below the 1 mg/kg gradient diagonal line.

Distractors

- A** is <5 mg and <1 mg/kg
- B** is <5 mg and >1 mg/kg
- C** is >5 mg and >1 mg/kg
- E** is >10 mg and >1 mg/kg

26 Arguments**Justification**

The key is **B**.

In **B** the second sentence – ‘They must be forgeries’ – follows from the facts that (1) the bank notes had the same serial number, and (2) that real bank notes would have different numbers.

Distractors

These all consist of related statements, but none follows from the others.

27 Polar bears

Justification

The key is **B**.

The weakness in this argument is that it infers, from the facts that bears in captivity behave obsessively, that captive conditions are the cause of the behaviour. This weakness is exposed by the claim that bears in the wild also behave this way. **A**, if true would strengthen the argument. The other neither strengthen nor weaken it

Distractors

- A** This is supportive of the conclusion.
- C** This neither weakens nor supports the argument. The argument is about the effects of captivity itself, not how well or badly fed captive animals are.
- D** This may explain why bears behave strangely, i.e. by being prevented from travelling far, but that does not weaken the argument. If anything it is supportive.
- E** This is largely irrelevant since the argument is about the effects of captivity. It is not recommending releasing bears into the wild, so reasons for not doing so have no impact.

28 Sign Language

Justification

The key is **E**.

The incomplete premise must reflect the evidence, i.e. the achievements of the Nicaraguan group, and support the claim that language is something we are born with. That, even without normal learning, 'sign language can be acquired...' meets these two requirements.

Distractors

- A** This would make little sense as a reason for the conclusion that follows.
- B** This is not 'shown by the evidence' and so it does not fit the sentence.
- C** This would make the sentence much too strong a claim to follow from the evidence.
- D** As with **C**, this would result in an unsupported claim, since there is no reason to suggest that sign-language acquisition is easy, only that it is possible.

29 Shareholders**Justification**

The key is **A**.

The fact that less than 50% of voters are in favour of the takeover is not a sufficient condition for its definite approval if some shareholders do not vote, since this could result in, e.g., 48% for, 49% against, 3% no vote. Therefore the comment, if true, severely weakens the argument because the result is not definite at all.

Distractors

B This is the closest. However, for the reasons given above it is too moderate in its assessment. By saying that the result in question is definite, the argument is exposed to the challenge of other possible outcomes.

C, D, E: The comment has to have a negative impact on the argument. So none of these assessments can be sustained.

30 Wind generators**Justification**

The key is **B**.

The data is indicative of a tendency, no more, making **B** the only acceptable answer.

Distractors

A This is too generalised.

C This is too generalised.

D The sample is too small to support such a claim.

E This is simply false: there is some correlation, though not a direct correlation.

