**Risky Russian Roulette**

**E. In depth - Open questions**

1. (lines 1-6) The Apollo space programme, more specifically the moon landing, and the bombing of Hiroshima and Nagasaki with nuclear bombs.

2. (lines 11-17) Forward contamination refers to the contamination that might be caused by the astronauts and their equipment to the moon / space; the latter refers to the possible (organic) life forms that the astronauts might bring back to Earth from the moon /space.

3. (lines 31-34) He is a scientist who researches attitudes and ideas that can lead to wrong decisions which might cause disasters.

4. (lines 51-53) This was the Trinity test, a nuclear test that might have released so much heat that the Earth would have burnt up, including the oceans.

5. (lines 54-58) This date marked the moment that humanity made a leap forward in its ability to destroy the planet.

6. (lines 68-75) They are decisions that were made knowing what people knew (about science) at that particular moment in history; they would not have been made knowing what we know now.

7. - Misaligned Artificial Intelligence (lines 83-84)

- Carbon emissions (lines 84-85)

- Genetic meddling with viruses (line 86)

8. The word ‘also’ (line 88) refers back to the additional risks mentioned in lines 84-86. By using the word ‘also’ he points out that there are more factors than those risks and he goes on by mentioning what they are.

9. The escalating danger (line 98) consists of the new threats that we face (misaligned AI, carbon emissions, meddling with viruses (lines 83-86)), plus the fact that our growing power outstrips our wisdom (political narrow-mindedness, misinformation) and global connectivity (lines 88-96).

10. (lines 97-113) It is visualised by describing the urn with white, grey and black balls. The black balls are exceedingly rare, but if you do pick one out, it means the destruction of the world.

11. (lines 118-120) They are future developments and/or technologies that we haven’t created yet, so we don’t know what they are and what risks they might involve.

12. (line 122) He is Jonathan Wiener, a law scholar of Duke University, who wrote about misconceptions of catastrophic risk, as mentioned in lines 31-34.

13. (line 129) - climate change

- deforestation

- overfishing

14. (lines 133-143) We have no experience of them; we cannot use our memory of earlier disasters and that is how our mind works: we work out what might happen in the future on the basis of what we know already.

15. (lines 144-151) The numbing effect (line 145) is that we don’t feel a hundred times as shocked if a disaster affects a hundred people instead of just one.

16. (lines 154-157) It means that in the end (literally) nobody will be held responsible for not getting it right, because the world will have been destroyed; there is simply nobody left to point an accusing finger at.

17. (lines 167-170) They would be utterly surprised, because they never realised that that might happen.

18. ‘Those horrified individuals’ (lines 172-173) are the people who caused the catastrophe and still have a little time to realise that they are responsible (lines 167-170).

**G. Watching and listening - Note taking**

a.

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|  | **Vocabulary** | **English** | **Your language** |
| 1. | crop | *harvest of fruit or vegetables* | *gewas* |
| 2. | to orbit | *to circle around something else* | *in een baan ergens omheen draaien* |
| 3. | to be on a collision course | *to be on a path leading to impact* | *dreigen te botsing, dreigen in te slaan* |
| 4. | to transmit into | *to pass on to* | *overbrengen op* |
| 5. | missile | *rocket with a nuclear head* | *kernraket* |
| 6. | governance | *politics, the way the world is governed* | *beheer, politiek* |
| 7. | soot | *ashes* | *as, roet* |
| 8. | hemisphere | *one of the two parts of the globe* | *halfrond* |
| 9. | dung beetle | *a kind of insect that lives on manure and such* | *mestkever* |
| 10. | resilience | *ability to withstand bad things or to bounce back* | *weerstand, veerkracht* |
| 11. | warehouse | *a large building in which things are stored* | *pakhuis* |
| 12. | prepper | *a person who spends his/her time preparing for the end of the world in order to survive* | *iemand die zich op allerlei manieren voorbereidt op het eind van de wereld zodat hij/zij zelf overleeft* |
| 13. | captivity | *the condition of being confined, not free* | *gevangenschap* |
| 14. | divine intervention | *through the hand of God* | *door goddelijke tussenkomst* |
| 15. | hunter-gatherer | *people who existed by hunting animals and foraging / gathering (edible wild plants), not growing, food* | *jager-verzamelaar* |
| 16. | tremendous | *enormous* | *enorm, heel groot* |
| 17. | collapse | *falling apart, breakdown* | *ineenstorting* |
| 18. | assumption | *hypothesis, theory* | *aanname, hypothese, theorie* |
| 19. | paleo demographic | *relating to the science of ancient population statistics* | *statistieken van vroege bevolkings-groepen betreffend* |
| 20. | applicability | *relevance, suitability* | *toepasbaarheid, relevantie* |
| 21. | to thrive | *to do well, to grow* | *het goed doen, groeien, bloeien* |
| 22. | non-perishable food | *food that keeps for a long time* | *niet-bederfelijk voedsel* |
| 23. | to retain | *to hold on to, to keep going* | *vasthouden, bewaren* |

b/c.

1. It would affect us humans: we would be starving and probably not survive as a species. There were no humans 200 million years ago.

2. None are on a collision course right now, but in time one of them will hit the Earth. They are a similar size to the one that hit Canada 200 million years ago, so they would destroy large parts of the world.

3. Very rarely; every 10 million years or so.

4 The Corona / Covid19 pandemic is not mentioned. It also shows in the video October 2017.

5. It was far more deadly: it killed 50 to 100 million people.

6. - Because of the war, their physical condition and resistance to disease was very low.

- Because of railway transport, it could easily spread further afield.

7. Scientists create viruses in labs, and they might escape, either by accident or on purpose. They might even be created in home labs.

8. The fall of the Berlin Wall in 1991.

9. The nuclear winter they create because of the soot that goes into the air: nothing will grow anymore. (Just as when an asteroid hits the Earth.)

10. It means that they might therefore also be fixable.

11. The minimum number of a species necessary for the survival of that species.

12. More males than females, so that the breeding population is even smaller; inbreeding; climatic or ecological fluctuations.

13. It stands for the disappearance of a species just as waters disappears down a drain, in a circular motion. A species could just drain away.

14. It is extremely uncertain; there are various theories, but we actually don’t know.

15. That a very small group, perhaps some 70 people, might be enough; then again there may have been more groups, some larger, some smaller, that weren’t successful.

16. We spread diseases that they have no resistance to / defence against.

17. Some data suggest that this is the minimum number of people that need to survive a disaster to keep the group or species going.

18. To move away and colonise another planet, such as Mars.

19. 150-40,000. Too few: inbreeding; too many would need too many trips in large space craft. 14,000 is what was believed to be enough.

20. Genetic selection through insemination of the women.

21. Because they only work for *stable* populations.

22. 5,000.

23. You spread the risks that way (epidemics, disease)

24. Most people in a crisis are saved by their neighbours.

25. With saying that it is everybody’s job to save humanity.

**I. In depth - Mixed questions**

1. c.

These two examples are mentioned without the author saying what exactly they entailed; he does ask, however, in what way they teach us something about how we approach similarly difficult situations we face today.

Not a. They are mentioned by way of a general introduction just because they are relevant: by looking at these, apparently momentous, decisions from the past, we can learn something with respect to today’s risks and crises.

Not b. We don’t know what the decisions were, it is true, but we do learn from these lines that they were very weighty. The author also mentions that how these decisions were reached can teach us something about how we (should) face risks and crises today.

Not d. These decisions can’t tell us how and why they were made, so this is a nonsensical answer.

2. a.

1% is not very high, but if back contamination happened, this 1 % could still be disastrous to life on Earth and is nothing to ‘be complacent about’. It is still a very grave risk.

Not b. It is not worth the risk; even 1 % could be disastrous to life on Earth and is nothing to be complacent about.

Not c. It isn’t said that they thought the risk was negligible, that is too small to be considered seriously. It is not explained why these scientists took such an enormous risk.

Not d. They didn’t call off the programme, that is just the point. They went along and took this enormous risk.

3. d.

Strict quarantine regulations were in place, but they were broken because of possible health risks to the astronauts, if they were kept in quarantine too long. That meant that back contamination could have occurred.

Not a. It doesn’t say if NASA told the astronauts about the quarantine procedures or not.

Not b. The astronauts were let out, they didn’t open the door themselves.

Not c. It is true that the astronauts feared for their well-being, locked up in the capsule and that NASA got them out, but this answer doesn’t mention that this procedure broke the quarantine rules and could have caused back contamination.

4. c.

The risk was very small, and the scientists involved checked and rechecked almost up to the last minute before the test, but they were willing to take that risk, despite the fact that it could have meant the end of our planet.

Not a. There was a risk, a very small one, but one with a devastating consequence: the destruction of our planet.

Not b. That scientists are extremely careful and accurate because they kept checking and rechecking up to the last minute, but they couldn’t eliminate the risk. They went ahead anyway, although potentially the test result might have burned up our planet, including the oceans.

Not d. That is not a conclusion, but the stating of a fact.

5. Why was Toby Ord so critical about Trinity test (lines 54-67)? For each statement, indicate whether it is correct or incorrect.

a. *Correct* There was no ‘peer review of a disinterested party’ (line 63).

b. *Incorrect* The military were involved, but they were not the only or most important party. The scientists were involved in the decision making as well.

c. *Correct* ‘no evidence that any elected representative was told about the risk’ (lines 64-65).

d. *Incorrect* They checked and rechecked their calculations, but they did not submit their findings for peer review.

6. a.

‘Nowadays, no-one would take risks like that again, right? Wrong’. You would think that with our advanced knowledge of our solar system and contamination, compared to 80 years ago, we would be more careful, but apparently, we aren’t. We take even more or bigger risks now than we did then.

Not b. It is not said that we would do the test again despite the risk. We now recognise what a big risk scientists took back then. However, it hasn’t taught us much because nowadays we take more and even bigger risks.

Not c. We can’t draw our own conclusions. Our answers must be based on the text and this isn’t mentioned in the text.

Not d. The text doesn’t say that nuclear science hasn’t developed much since WWII. The period is mentioned because around that time nuclear tests took place, and of course the nuclear bombs on Hiroshima and Nagasaki. It is about the risks we took then, and the even bigger risks we are taking now. We do not seem to have learned anything.

7. - estimates (line 76)

- believes (line 78)

- argues (line 82)

8. b.

He mentions the pandemic as an example: it has been surrounded by misinformation and political narrow-mindedness. That is not wisdom. By using this example, he shows us that our power has outstripped our wisdom.

Not a. Global connectivity helps spread viruses, it is true, but that has nothing to do with our power outstripping our wisdom. The example is the pandemic with all the misinformation and political narrow-mindedness surrounding it.

Not c. He mentions the pandemic to illustrate what he means by our power outstripping our wisdom, but not because we could have stopped it. It is about the misinformation and political narrow-mindedness surrounding it: that shows that our wisdom is lacking.

Not d. That may be true, but it is not stated in the text. This answer doesn’t mention the example he gives, either: it doesn’t mention the pandemic.

9. c.

It is a way of visualising the risk of something: the black balls are exceedingly rare, but the next one you pick out of the urn might be a black ball. The risks our world faces are similar: a disaster might strike tomorrow or in 10 million years. We simply don’t know. We are either lucky or unlucky.

Not a. Those are represented by the white balls, but that is not the point here. The point is that this visualises the chances of a catastrophe.

Not b. True, but this answer is much too vague. Vulnerable to what? To what degree?

Not d. It is not about preparing for something that we can’t see coming; it is about our chances of picking out a black ball, which stands for a catastrophe. We simply don’t know when it will happen, tomorrow or 10 million years from now.

10. d.

There are three main kinds of risks with regard to technology and discoveries. It goes for all three that enormous risks are involved that we don’t know about, in increasing measure: the last category involves discoveries and technology that we don’t even have yet, so we have no idea about what kind of risks they may bring.

Not a. This is not so much about technology and discoveries that we have already, but also about the unknown ones that are still in the future.

Not b. There are: the unknown unknowns; but it is not just about them; it is also about existing technology such as nuclear power and AI.

Not c. The author just makes clear what categories of technology and discoveries there are. The subdividing into categories in itself doesn’t show us that we don’t take the risks seriously.

11. b.

The tragedy of commons and tragedy of *uncommons* are two different things. The only thing they have in common is that they affect the whole of humankind and even the planet to more or less the same degree, especially because we misperceive these ‘*uncommons*’.

Not a. They are about two different sets of problems, but wilful selfishness is not involved in all of them, such as e.g. an asteroid hitting Earth. The tragedy of the latter is that we misperceive the risks, the tragedy of the commons is that we know the risks but are slow to respond.

Not c. They are not completely unrelated: they both affect the whole of the human race and the planet, and both represent enormous risks.

Not d. The word ‘common’ has a different meaning here: it refers to the resources that we all share, not to the incidence rate of disasters. ‘Uncommon’, on the other hand, does refer to the rarity of catastrophic events and therefore our misperception of them.

12. a. *Correct* We build an image of the future based on what we already know. We can’t visualise something completely new that we have never seen before.

b. *Incorrect* Nothing is said about misinformation in these lines.

c. *Incorrect* It is true that news stories lead to concern and action, but the text doesn’t say that politicians only act when some news reaches the headlines.

d. *Correct* It is impossible to use our experience for something we have never experienced before.

13. c.

1. *Correct* Once they have destroyed the world there is nobody left to hold them to account or to take them to court.

2. *Correct* They won’t have to answer to anyone once the world has been destroyed because of their actions and decisions. It means that they care less than they should.

3. *Incorrect* That aspect was mentioned earlier, but not in these lines.

4. *Incorrect* There are laws against negligence, you could get sued, but the world has ended so there’s nobody left to drag you to a court that is no longer there.

14. Perhaps the (line 158).

15. d.

He hopes, that when the time comes for another crucial scientific decision, the scientists and other people involved will make the right choice. He is neither pessimistic nor optimistic.

Not a. He is not at all sure. He hopes they will be wise enough, but he is not certain that they will be.

Not b. He says scientists may already be hurtling towards disaster, but also that he hopes they will make the right choices and take the right decisions

Not c. ‘Irony’ is that you say the opposite of what you mean to create a humorous effect or to criticise. That is not the case here.