PISA Style Scientific Literacy Question

Thalidomide

In the 1950s pregnant women took a drug called Thalidomide to prevent morning sickness. It had originally been used as a sleeping pill but it also had the side effect of preventing nausea. At first Thalidomide was available without prescription.

Thousands of babies of mothers who had taken Thalidomide were born with terrible birth defects – most commonly shortening of the limbs. It was discovered that the Thalidomide drug binds to a protein called cereblon which is important in limb formation, and stops cereblon from working.

Mothers are no longer given Thalidomide during pregnancy. Thalidomide continues to be prescribed to humans as it is now known to be useful in treating leprosy and some cancers.

Question 1 : THALIDOMIDE

Thalidomide caused terrible birth defects by inactivating a protein needed for babies limbs to develop properly. Which of the statements below would be the best method of finding out that Thalidomide would have this effect?

A Test whether Thalidomide works to cure morning sickness
B Carry out research into the side effects of Thalidomide
C Test Thalidomide on animals who are pregnant
D Test Thalidomide on a group of young babies

Question 2 : THALIDOMIDE

Some people are against testing drugs on animals.

Give one scientific argument that supports the use of animals to test drugs

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_____

Give one scientific argument against using animals to test drugs.

_____
_____

Question 3 : THALIDOMIDE

Initially, Thalidomide was available without prescription.

Why did the fact that women did not need to see a doctor before taking Thalidomide increase the occurrence of Thalidomide related birth defects?

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Question 4 : THALIDOMIDE

Why do you think the use of Thalidomide was not banned, even after it was proven that it caused birth defects?

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_____
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Question 5 : THALIDOMIDE

Doctors try to prevent Thalidomide related birth defects by restricting its use to people who are not pregnant or likely to become pregnant. Despite this, some new cases of Thalidomide related birth defects still occur.

Circle 'increase' or 'decrease' for each of these statements.

Statement	**The occurrence of Thalidomide related birth defects will likely…**
Women buy Thalidomide illegally (e.g over the internet) and as a result are not made fully aware of the possible side effects	Increase / decrease
A person who is taking Thalidomide to treat another disease unintentionally becomes pregnant	Increase / decrease

The drug is now only available on prescription	Increase / decrease

SCORING : THALIDOMIDE

Question 1 : THALIDOMIDE

Full credit :

Answer C – Test Thalidomide on a pregnant animal

No credit :

Other responses

Missing

Narrative:

A – This method would not be suitable as morning sickness itself does not cause the birth defects. This kind of trial would be looking at the efficacy of the drug, and not its side effects.
B – This method may pick up the occurrence of birth defects but only if members of the research group included pregnant women / animals
C- This is the best method as it specifically looks into the effects of the drug on the mother and foetus
D – Testing babies would not necessarily give an indication of the effect of the drug on a developing foetus, especially if the harm is done at an early stage of development.

Framework Categories	2015 Framework
Knowledge Type	*Procedural*
Competency	*Evaluate and design scientific enquiry*
Context	*Health and disease* *Frontiers of science and technology*
Cognitive demand	*Medium*

Question 2 : THALIDOMIDE

Part 1

Full credit :

Animals are similar to humans so are likely to have similar responses to the drug
We can see if the drug is poisonous / toxic before giving it to humans
We can see if the drug has side effects before giving it to humans
We can see if the drug actually works before giving it to humans
Humans will not be harmed by taking a drug that is not safe
Many human lives have been saved by drugs which have been tested on animals
We may not be able to continue to develop new important drugs if we don't test them on animals

No credit :

Missing

Part 2

Full credit :

The drugs or the illness that is being treated may cause suffering or death to the animal
There are other methods e.g computer simulations that could be used to test the drug
Animals aren't exactly the same as humans so they may not give relevant or exact information about how the drug works.
The drug may not actually get used in the long run and the harm to the animals may have been needless

Partial credit :

Testing on animals is cruel

No credit :

Other responses

Missing

Framework Categories	2015 Framework
Knowledge Type	*Procedural*
Competency	*Evaluate and design scientific enquiry*
Context	*Health and disease* *Frontiers of science and technology*
Cognitive demand	*High*

Question 3 :

THALIDOMIDE

Full credit :

Doctors would not be able to warn patients of possible side effects
The use of the drug cannot be monitored
Doctors would not know if a pregnant woman was taking the drug
Doctors would not link the birth defects to the use of the drug straightaway
People might think the drug was harmless and take it inappropriately

Partial credit :

No credit :

Other responses

Missing

Framework Categories	2015 Framework
Knowledge Type	*Procedural*
Competency	*Explain phenomena scientifically*
Context	*Health and disease* *Frontiers of science and technology*
Cognitive demand	*Medium / high*

Question 4 : THALIDOMIDE

Full credit :

Thalidomide worked well as a sleeping pill
Thalidomide worked well to prevent nausea
Thalidomide has now been found to treat leprosy
Thalidomide has now been found to treat some cancers
If we had banned it we would not know that it could be useful to treat other illnesses
If we had banned it we would not be able to use it as a sleeping pill

Partial credit :

We have been able to use it in other ways / we would not have been able to use it in other ways (other ways not specified)

No credit :

Other responses

Missing

Framework Categories	2015 Framework
Knowledge Type	*Procedural*
Competency	*Explain phenomena scientifically*
Context	*Health and disease* *Frontiers of science and technology*
Cognitive demand	*Medium / high*

<u>Question 5 : THALIDOMIDE</u>

Full credit :

Increase, increase, decrease, in that order

No credit :

Other responses

Missing

Narrative :

Increase – birth defects are more likely if women buy Thalidomide illegally because they are less likely to be warned or be given medical advice about the potential harm to a foetus.
Increase – birth defects are more likely if a woman using Thalidomide gets pregnant unintentionally because they may not realise they are pregnant before the harm has been done to the foetus
Decrease – The drug being only available on prescription is likely to decrease the number of birth defects because women will only be able to obtain it from a doctor who will give them medical advice about the birth defects it can cause / check if they are pregnant before prescribing it.

Framework Categories	2015 Framework
Knowledge Type	*Procedural*
Competency	*Explain phenomena scientifically*
Context	*Health and disease* *Frontiers of science and technology*
Cognitive demand	*Medium / high*