

Questions

Q1.

In 2015, the number of cases of malaria was 211 million. This increased to 216 million cases in 2016.

Give the change in the number of cases of malaria in standard form.

(1)

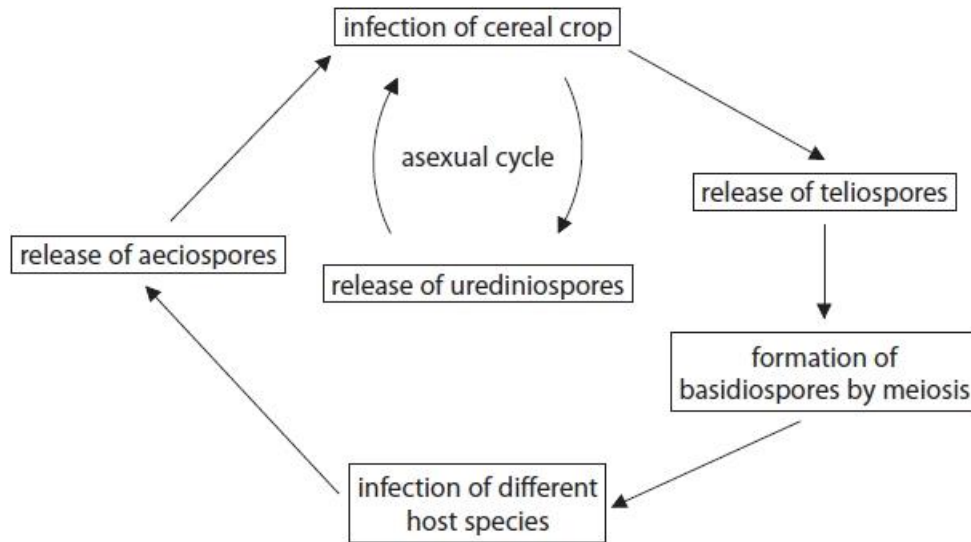
Answer

(Total for question = 1 mark)

Q2.

The stem rust fungus is responsible for destroying cereal crops and reducing grain yield.

The diagram shows some stages in the life cycle of the stem rust fungus.



Explain how stem rust fungus results in a reduction in grain yield.

(3)

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(Total for question = 3 marks)

Q3.

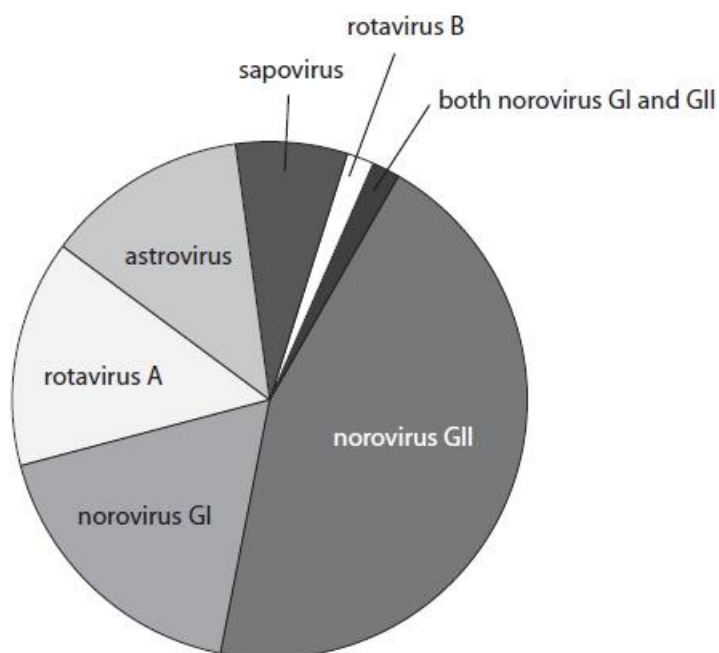
Norovirus is a single-stranded RNA, non-enveloped virus.

Norovirus is the most common cause of gastroenteritis.

One study into the causes of gastroenteritis involved 162 patients.

This study found that 24.7% of these gastroenteritis cases were caused by viruses.

The pie chart shows the proportion of the different types of virus identified as causing these gastroenteritis cases.



Estimate the total number of gastroenteritis cases caused by noroviruses.

(3)

Answer

(Total for question = 3 marks)

Q4.

Malaria is a serious and sometimes fatal disease.

Scientists are constantly looking for new ways of controlling this disease.

One group of scientists has genetically modified a fungus to produce a spider toxin that kills mosquitoes.

Another group of scientists has discovered a type of fungus that completely protects mosquitoes from infection by the pathogen that causes malaria.

This fungus does not kill the mosquitoes.

Explain why this approach is less controversial than the approach used by the scientists who are developing the genetically-modified fungus.

(3)

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(Total for question = 3 marks)

Q5.

Answer the question with a cross in the boxes you think are correct . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

Mosquitoes transmit a number of diseases, including malaria.

The photograph shows a mosquito, *Anopheles gambiae*.

This mosquito transmits malaria.



Source: © Sinclair Stammers / Science photo library

(i) State the genus of this mosquito.

(1)

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(ii) Mosquitoes belong to the class Insecta.

Some of the insects in this class are subdivided into a group called Diptera.

What is the name of the classification group that includes Diptera?

(1)

- A Family
- B Genus
- C Order
- D Phylum

(iii) Which of the following organisms causes the symptoms of malaria?

(1)

- A *Anopheles gambiae*
- B *Plasmodium falciparum*
- C *Puccinia graminis*
- D *Salmonella enterica*

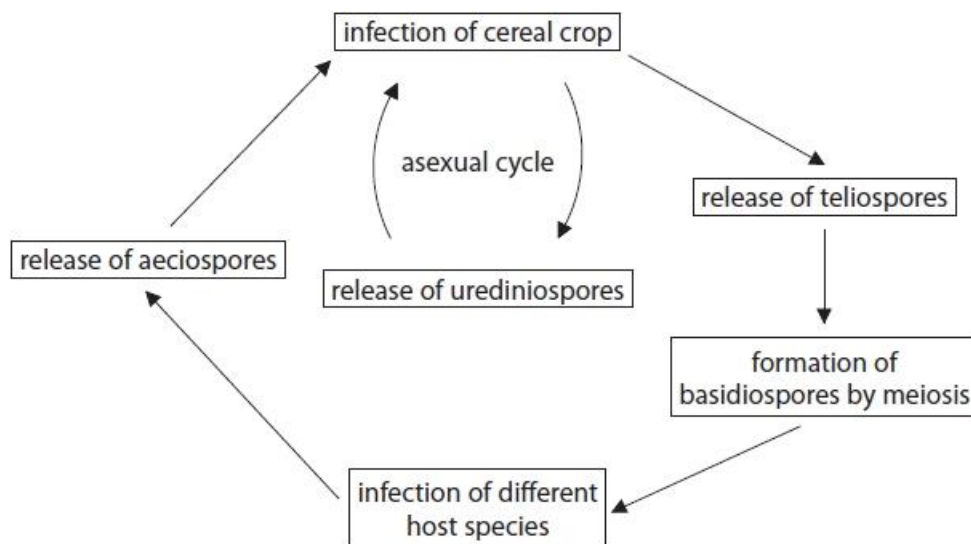
(Total for question = 3 marks)

Q6.

Answer the question with a cross in the box you think is correct . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

The stem rust fungus is responsible for destroying cereal crops and reducing grain yield.

The diagram shows some stages in the life cycle of the stem rust fungus.



Which genus does the stem rust fungus belong to?

- A Plasmodium
- B Puccinia
- C Salmonella
- D Staphylococcus

(1)

(Total for question = 1 mark)

Q7.

From 2010 to 2015 there was a 29% decrease in the number of deaths from malaria. This was due to prevention and control measures.

(i) Explain **one** implication of a named method of controlling malaria.

(2)

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(ii) In 2015, the number of deaths from malaria was 429 000.

Calculate the number of deaths from malaria in 2010.

(2)

Answer

(Total for question = 4 marks)

Q8.

Malaria is a serious and sometimes fatal disease.

Scientists are constantly looking for new ways of controlling this disease.

Which row of the table shows the name of the pathogen that causes malaria, and its classification group?

(1)

	Name of pathogen	Classification group
<input type="checkbox"/> A	<i>Plasmodium</i>	genus
<input checked="" type="checkbox"/> B	<i>Plasmodium</i>	species
<input type="checkbox"/> C	<i>Puccinia</i>	genus
<input type="checkbox"/> D	<i>Puccinia</i>	species

(Total for question = 1 mark)

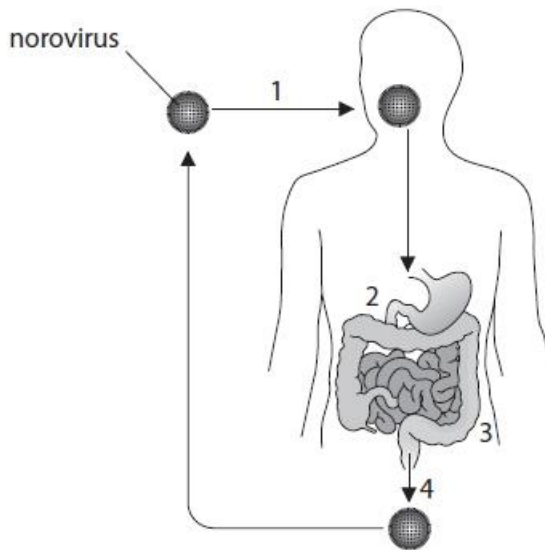
Q9.

Norovirus is a single-stranded RNA, non-enveloped virus.

Norovirus is the most common cause of gastroenteritis.

Norovirus is usually spread through the faecal-oral route.

The diagram shows the pathway that norovirus takes through the body.



- 1 The norovirus is transmitted in contaminated food or water.
 - 2 The norovirus passes through the stomach and into the small intestine.
 - 3 Some noroviruses are taken up by the cells of the small intestine.
 - 4 Some noroviruses pass out of the body in the faeces.
- This process only takes a few hours.

Describe what happens inside the cells of the small intestine that have taken up the norovirus.

(3)

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(Total for question = 3 marks)

Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
	<ul style="list-style-type: none"> answer in standard form 	e.g. 0.5×10^7 / 5×10^6	(1)

Q2.

Question Number	Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> (stem rust) fungus {takes up / uses} {nutrients / glucose / amino acids} (1) less {glucose to form starch / amino acids to form protein} (1) (stem rust) fungus interferes with vascular tissue (1) consequence of damaged vascular tissue (1) 	<p>ACCEPT glucose for respiration (by the plant)</p> <p>e.g. weakened stems , less magnesium ions for chlorophyll, less sucrose to transport to roots</p>	

Q3.

Question Number	Answer	Additional Guidance	Mark
	<ul style="list-style-type: none"> number of patients with gastroenteritis caused by viruses (1) pie chart used to estimate proportion of cases caused by noroviruses (1) total number of gastroenteritis cases caused by noroviruses (1) 	<p><u>Example of calculation:</u></p> <p>$162 \times 24.7 \div 100 = 40$ (40.014)</p> <p>60 - 70 %</p> <p>24, 25, 26, 27, 28 people</p> <p>Correct answer with no working gains full marks</p>	(3)

Q4.

Question Number	Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> not unethical as mosquitoes not killed (1) risk of other organisms being affected by the genetically-modified fungus is avoided (1) organisms that feed on mosquitoes will not lose their food supply (1) some people believe that modifying DNA is {wrong / unethical} (1) 	<p>ACCEPT converse for other approach</p> <p>e.g. toxins could harm other organisms, transfer of genes into other organisms ACCEPT unknown risks</p> <p>ACCEPT biodiversity maintained / ecosystems not disrupted / food chain not disrupted</p>	(3) EXP

Q5.

Question Number	Answer	Additional Guidance	Mark
(i)	<ul style="list-style-type: none"> <i>Anopheles</i> 	DO NOT ACCEPT <i>Anopheles gambiae</i>	(1)CL

Question Number	Answer	Mark
(ii)	<p>The only correct answer is C Order</p> <p><i>A is incorrect because organisms in orders are sub-divided into families</i></p> <p><i>B is incorrect because organisms in families are sub-divided into a genus</i></p> <p><i>D is incorrect because organisms in phylum are sub-divided into classes</i></p>	(1)

Question Number	Answer	Mark
(iii)	<p>The only correct answer is B <i>Plasmodium falciparum</i></p> <p><i>A is incorrect because Anopheles gambiae is the vector and not the pathogen</i></p> <p><i>C is incorrect because Puccinia graminis causes stem rust</i></p> <p><i>D is incorrect because Salmonella enterica causes food poisoning</i></p>	(1)

Q6.

Question Number	Answer	Additional Guidance	Mark
	B Puccinia	A is incorrect because Plasmodium is a protocista that causes malaria C is incorrect because Salmonella is a bacteria that causes food poisoning D is incorrect because Staphylococcus is a bacteria that causes food poisoning	

Q7.

Question Number	Answer	Additional Guidance	Mark
(i)	<p>An explanation that makes reference to one pair from the following:</p> <ul style="list-style-type: none"> • mosquito coils / mosquito nets / insect repellent (1) • because {too expensive / not always available} (1) <p>OR</p> <ul style="list-style-type: none"> • anti-malarial tablets (1) • because {too expensive / not always available / side effects} (1) <p>OR</p> <ul style="list-style-type: none"> • avoiding stagnant water (1) • because impractical as people's {homes / work} are near stagnant water (1) <p>OR</p> <ul style="list-style-type: none"> • long clothing (1) 	<p>ACCEPT {removing / adding chemicals} to stagnant water ACCEPT affects organisms living in the water</p>	(2)

	<ul style="list-style-type: none"> because impractical for working (1) <p>OR</p> <ul style="list-style-type: none"> insecticide (1) expensive / can {poison / kill} other organisms / can affect the food chain (1) <p>OR</p> <ul style="list-style-type: none"> sterile insect technique (1) not fully tested / expensive (1) <p>OR</p> <ul style="list-style-type: none"> biological control (1) can affect the food chain (1) 		
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Question Number	Answer	Additional Guidance	Mark
(ii)	<ul style="list-style-type: none"> percentage of deaths in 2015 compared to 2010 (1) number of deaths in 2010 (1) 	<p><u>Example of calculation:</u></p> <p>100 - 29 = 71</p> <p>429 000 × 100 ÷ 71 = 604 225 / 604 000</p>	(2)

Q8.

Question Number	Answer	Additional Guidance	Mark
	<p>The only correct answer is A</p> <p>B is incorrect because <i>Plasmodium</i> is the genus name not the species name</p> <p>C is incorrect because <i>Plasmodium</i> causes malaria not <i>Puccinia</i></p> <p>D is incorrect because <i>Plasmodium</i> causes malaria not <i>Puccinia</i></p>		(1) COMP

Q9.

Question Number	Answer	Additional Guidance	Mark
	A description that makes reference to the following: <ul style="list-style-type: none">• (viral) RNA made (1)• (viral) {capsid / protein} made (1)• assembly of viruses (1)	ACCEPT new virus particles made	(3)