Do not write outside the box

0 7 Many people eat shellfish called oysters.

An oyster has 20 chromosomes in each body cell.

0 7 . 1 Which arrangement of chromosomes will a male oyster have in each body cell?

[1 mark]

Tick **one** box.

One X and one Y chromosome and 8 pairs of other chromosomes ☐

Two X and two Y chromosomes and 8 pairs of other chromosomes ☐

One X and one Y chromosome and 9 pairs of other chromosomes ☐

Two X chromosomes and 9 pairs of other chromosomes ☐

0 7 . 2 Oyster gametes only contain half the amount of DNA compared to a normal oyster body cell.

Describe the type of cell division that produces gametes.

[3 marks]

Question 7 continues on the next page

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Biologists have discovered a way to produce oysters that have three sets of chromosomes (triploid) instead of the usual two sets (diploid).

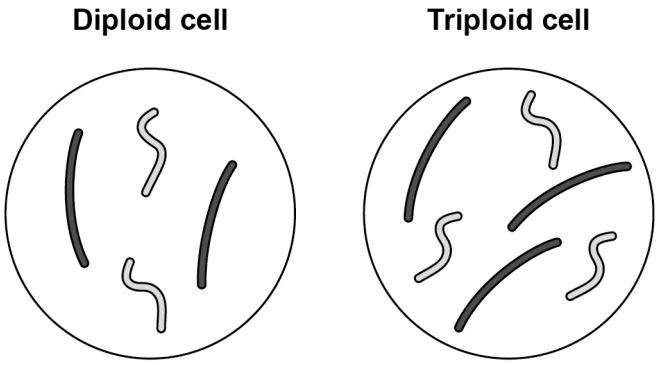
The triploid oysters cannot reproduce and so they grow more quickly.

Diploid oysters do not taste good in the reproductive season. Triploid oysters taste good all year.

Figure 5 shows the chromosomes in a diploid cell and in a triploid cell.

Only two sets of chromosomes are shown.

Figure 5



0 7 . 3 Suggest why the triploid oysters are **not** able to reproduce.

[1 mark]

0 7 . 4 Explain why the triploid oysters grow more quickly than the diploid oysters.

[2 marks]

Do not write outside the box

0 7 . 5 The population of diploid oysters growing in the wild has reduced by over 80% in the last 20 years.

Suggest **two** environmental factors which may be causing this reduction.

Give a reason why each factor may be causing the reduction in the population.

[2 marks]

1 _____

_____

2 _____

_____

0 7 . 6 Oyster farmers grow the triploid oysters from young seed oysters.

The production of seed oysters involves the use of a chemical called cytochalasin B. Cytochalasin B has been shown to cause cancer in mice.

Evaluate the production of triploid oysters for supermarkets and restaurants.

[6 marks]

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END OF QUESTIONS

15

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	one X and one Y chromosome and 9 pairs of other chromosomes		1	AO2 4.6.1.6
07.2	any **three** from: • (called) meiosis • DNA / chromosomes replicate **or** DNA makes a copy • two divisions to form 4 cells • so only 1 set of chromosomes per cell • (daughter cells / gametes) are all genetically different	correct spelling only allow cells are haploid ignore half the DNA if no other mark awarded allow **1** mark for forms gametes / cells which are all different **or** only happens in testes and (embryonic) ovaries	3	AO1 4.6.1.2
07.3	(meiosis will not work because) number of chromosomes cannot halve	allow chromosomes cannot form pairs allow chromosomes cannot split up evenly	1	AO2 4.6.1.2
07.4	do not use energy in reproduction so more (energy) available to synthesise proteins	allow converse if clearly describing diploid oysters allow other correct molecules or cell components	1 1	AO2 4.6.1.3 4.4.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	any **two** from: • global warming may be raising temperature of water and killing oysters • pollutants in the water may be toxic and kill the oysters **or** increased acidity of the oceans is killing oysters • new competitors / triploid oysters are using up the normal food source • new pathogens may be causing diseases • new predators eating oysters	allow correctly named pollutant with reason ignore over harvesting	2	AO2 4.7.3.5 4.7.3.2 4.7.1.2 4.7.1.3

Question	Answers	Mark	AO / Spec. Ref.
07.6	**Level 3:** A judgement strongly linked and logically supported by a sufficient range of correct reasons is given.	5–6	AO3
	Level 2: Some logically linked reasons are given. There also may be a simple judgement.	3–4	AO3 AO2
	Level 1: Relevant points are made. They are not logically linked.	1–2	AO2
	No relevant content	0	
	Indicative content **for:** • oysters are available to eat all year **so** eating oysters has become very popular • cheaper to produce **so** more food for expanding population • oysters grow faster **so** more oysters for supermarkets / restaurants or more profit for farmers • stocks are replenished each year **so** more sustainable fishing • they can harvest / sell all year **so** more stable and profitable for oyster farmers **against:** • carcinogen put into environment / oysters **so** may enter the food chain or cause cancer in humans • bigger triploid oysters may outcompete the smaller native diploid oysters **so** upset balance of the ecosystem / cause extinction • people may not buy / eat them because they have used a carcinogenic chemical **so** reduced profit for farmers / suppliers / supermarkets / restaurants • farmers have to buy new seed oysters every time **so** more expensive **other content:** • shouldn't be eating the oysters until they are thoroughly tested • should be looking for alternative ways to get triploid oysters • should stop using triploid oysters until the effect on the (marine) environment is known • would replace lost oyster beds **but** could change the ecosystem • oysters available to eat all year **but** probably do not taste the same or have the same flavour		4.7.3.2 4.7.3.6 4.7.2.1 4.7.1.3 4.7.1.1
Total		**15**	