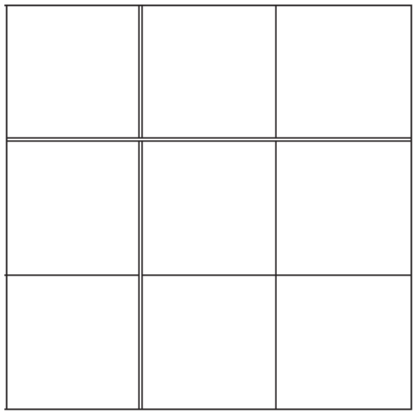
Exam Prep 2+3 *[35 marks]*

1a. Using the Punnett grid, explain how two parents can have children with any of the different ABO blood groups. *[3 marks]*



1b. Distinguish between the structure of arteries and the structure of veins. *[3 marks]*

1c. Explain how cuts in the skin are sealed by blood clotting. *[2 marks]*

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Reproduction in eukaryotes can be sexual or asexual.

2a. Describe the origin of eukaryotic cells according to the endosymbiotic theory. *[4 marks]*

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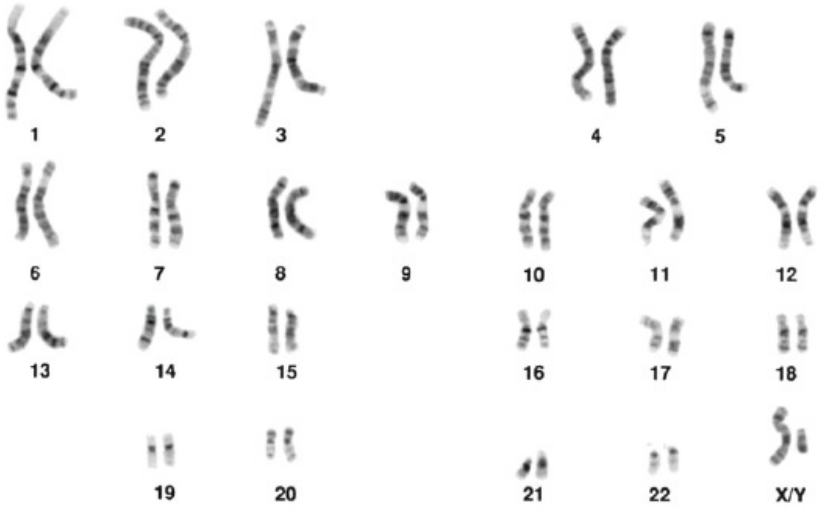
2b. Explain how hormones are used to control the human menstrual cycle. *[8 marks]*

2c. Outline natural methods of cloning in some eukaryotes. *[3 marks]*

3. A pregnant woman had fetal cells removed by chorionic villus sampling and tested. The following karyogram was produced. *[1 mark]*



[Source: Mediscan / Alamy Stock Photo]

What does this show?

A. The child is female with Down syndrome.

B. The child is female without Down syndrome.

C. The child is male with Down syndrome.

D. The child is male without Down syndrome.

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4. A variety of *Pelargonium* has yellow leaves. When plants of this variety are crossed, the resulting seeds produce green, yellow and white seedlings in the ratio 1 : 2 : 1. If plants with yellow leaves are crossed with plants with green leaves, what would the expected ratio of phenotypes in the offspring be? *[1 mark]*

	Green	Yellow	White
A.	1	2	1
B.	3	1	0
C.	2	2	0
D.	2	1	1

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5. What is PCR used for? *[1 mark]*

A. Separate fragments of DNA by size

B. Amplify small amounts of DNA

C. Compare DNA samples

D. Genetically modify organisms' DNA

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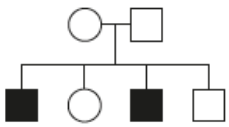
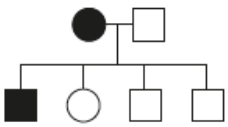
6. Which pedigree chart is consistent with the inheritance of red-green colour blindness? *[1 mark]*

A.



B.



Key:

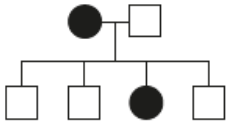
normal-vision female

normal-vision male

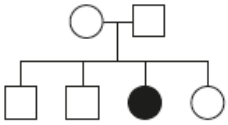
colour-blind female

colour-blind male

C.



D.



[Source: © International Baccalaureate Organization 2019]

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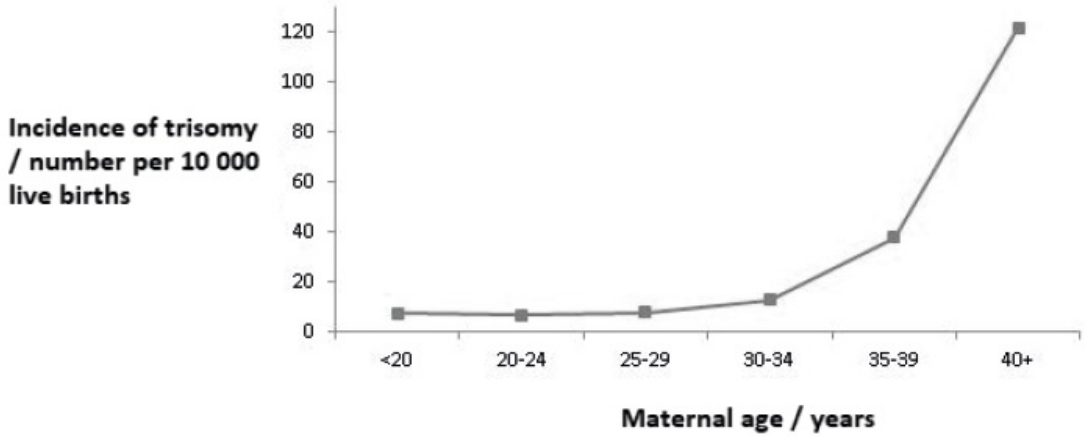
7. The graph shows the incidence of trisomy resulting from non-disjunction in pregnancies at different maternal ages. *[1 mark]*



[Source: Center for Disease Control]

What can be inferred from the graph?

A. The incidence of three copies of a chromosome increases directly in proportion with the age of the mother.

B. The incidence of three sets of chromosomes increases from age 20.

C. The incidence of three copies of a chromosome increases the most from age 35.

D. The incidence of three sets of chromosomes increases the most from age 30.

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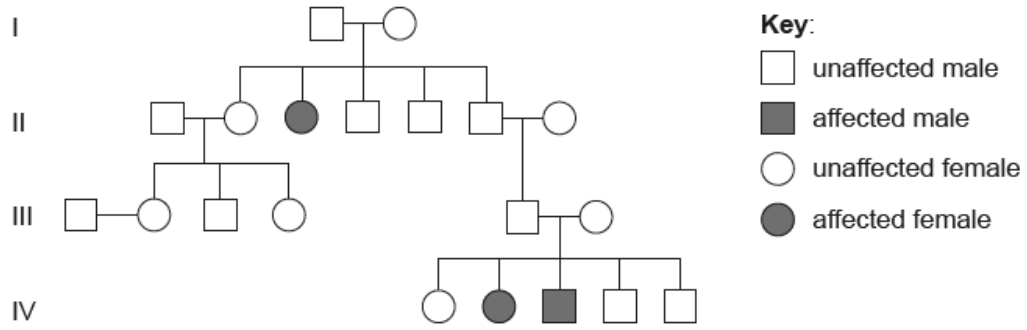
8. The pedigree chart shows a family affected by cystic fibrosis. *[1 mark]*



[Source: © International Baccalaureate Organization 2019]

What is the genotype of the affected boy's father?

A. AA only

B. Either AA or Aa

C. Aa only

D. aa only

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9. Which statement correctly describes genome and proteome? *[1 mark]*

A. Only the genome but not the proteome can be analysed using gel electrophoresis.

B. The genome and the proteome are the same in all tissues in an organism.

C. In cells of different tissues, the genome is the same while the proteome varies.

D. Only mutations in the proteome but not in the genome cause any variability.

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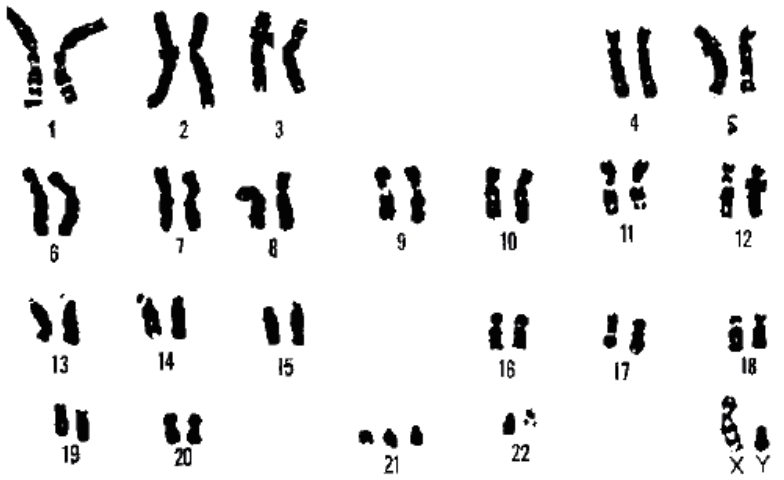
The image shows the chromosomes from a body cell of an adult human.



[Source: http://www.ornl.gov/sci/techresources/Human_Genome/graphics/slides/elsikaryotype.
U.S. Department of Energy Human Genome Program.]

10a. Identify, with a reason, the sex of this individual. *[1 mark]*

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10b. Identify the chromosome that is affected by a trisomy in this individual, naming the condition that this trisomy gives rise to. *[1 mark]*

Chromosome number:

Name of condition:

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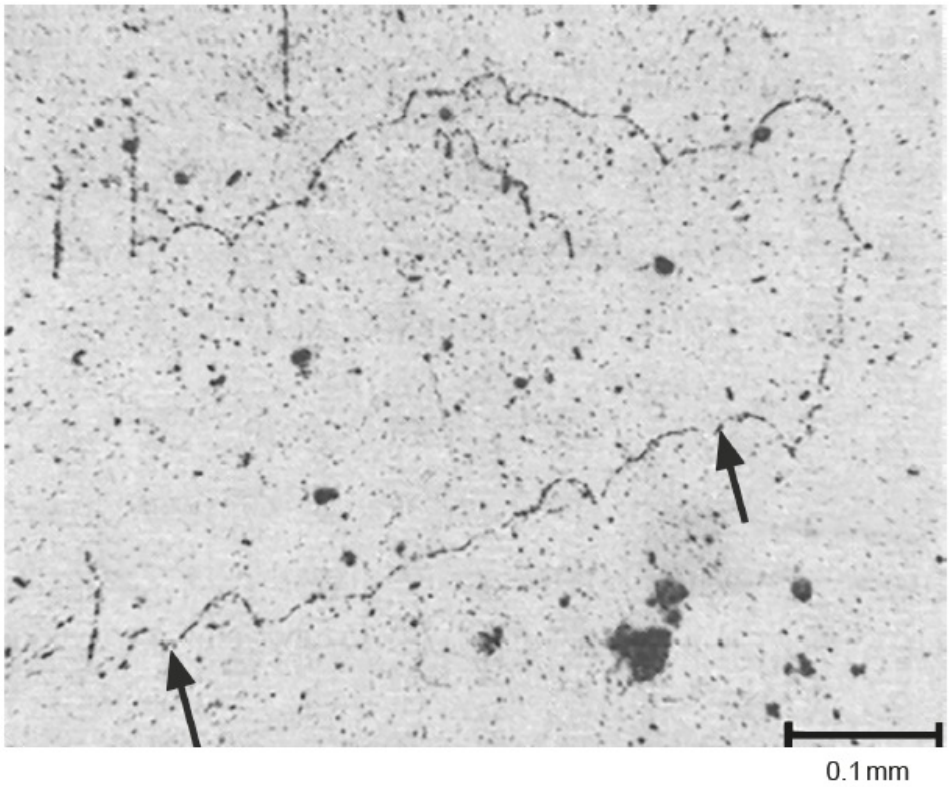
Cairns' technique was used in an experiment to measure the length of DNA in the Chinese hamster (*Cricetulus griseus*). Fibroblast cells were grown with radioactive nucleotides. The DNA autoradiogram obtained is shown.



[Source: © Joel A. Huberman and Arthur D. Riggs]

11a. Estimate the length of the molecule of DNA shown in the autoradiogram between the two arrows. *[1 mark]*

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11b. Determine, with a reason, the nucleotide base that was marked with radioactivity. *[2 marks]*

Base:

Reason:

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