

**MARK SCHEME for the October/November 2009 question paper
for the guidance of teachers**

0608 21ST CENTURY SCIENCE

0608/04

Paper 4 (Written – Extended), maximum raw mark 60

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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
CIE is publishing the mark schemes for the October/November 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

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1 (a) 1
78
21
all correct = 2
two or one correct = 1 [2]

(b) (i) the range is smaller / the values are closer [1]

(ii) the mean for the highway/45 is not within the range for the country road/6 to 9;
the mean for the country road/9 is not within the range for the highway/43 to 48
allow 'the ranges do not overlap' for one mark [2]

(c) 
one mark for each molecule, circles must touch [2]

[Total: 7]

2 (a) polythene is more flexible so less likely to crack
ora [1]

(b) energy needed to make material;
environmental impact of making material;
energy needed to make pipe from material;
environmental impact of making pipe from material;
environmental impact of disposing of pipe
any two [2]

(c) description:
energy/environmental impact of making product from material /
energy/environmental impact of using the product;
explanation:
product has different shape/thickness/size/amount of material /
product is used in different way/lasts different length of time
accept valid alternatives [2]

(d) particles/chains held together by forces;
plasticizer molecules get between chains and make forces weaker [2]

[Total: 7]

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
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3 (a) hydrocarbon carbohydrate amino acid
all correct = 2
two or one correct = 1 [2]

(b) (i) farmers growing organic produce do not use synthetic fertiliser; they can get a higher price for organic produce;
or
farmers in developing countries do not use synthetic fertiliser; they cannot afford it;
accept valid alternatives [2]

(ii) by action of lightning forming nitrogen oxides;
by nitrifying/nitrogen fixing bacteria in roots of legumes/in the soil; [2]

[Total: 6]

4 (a) Any two of the following 'fits' or 'matches':
continents;
fossils;
mountain chains;
rocks types
One mark for each correct response. If more than 2 given, mark first two only. [2]

(b) Any one of:
cannot detect continents move;
Wegener was an outsider to the community of geologists;
too big an idea on limited evidence;
simpler explanations worked as well. [1]

(c) 10 cm
Allow between 1 cm and 50 cm [1]

(d) (i) hot magma rises (at ridge) and solidifies; Earth's magnetic field changes from time to time;
magnetisation 'frozen in' when magma solidifies;
rocks pushed outwards by fresh magma rising
Any two points [2]

(ii) thin and thick stripes (roughly) symmetrical about the ridge;
implies that 'pairs' of stripes were created at the same time (and spread out). [2]

[Total: 8]

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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- 5 (a) Aruna ✓
 Bilal
 Chen
 David ✓
One mark each. Deduct a mark for each extra tick. [2]
- (b) Aruna
 Bilal
 Chen
 David ✓ [1]
- (c) Aruna ✓
 Bilal
 Chen
 David [1]
- (d) Aruna
 Bilal ✓
 Chen
 David [1]
- [Total: 5]**
- 6 (a) (i) goes down (1);
 change gets less and less with time (1) [2]
- (ii) 30 years
Must have indication on graph or explanation in space [1]
- (b) evidence of halving in 200 000 years (1);
 3 half lives, so 600 000 years (1) [2]
- (c) **space:**
for: well away from Earth / permanent disposal;
against: accident on take-off would spread waste widely / very costly
underground:
for: far from people / will be safe for millions of years;
against: could leak into environment / vulnerable to earthquakes / unpopular with local residents
on surface:
for: cheap and easy to transport / can be supervised
against: vulnerable to earthquakes / terrorists etc could target them / can corrode and leak / unpopular with local residents
Conclusion: answer must weigh up for and against and come to a reasoned decision
Needs 1 for, 1 against and 1 conclusion mark [3]
- [Total: 8]**

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
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- 7 (a) unspecialised cells so can develop into any type of cell [1]
- (b) (i) B [1]
- (ii) A [1]
- (c) nucleus removed from egg cell;
nucleus from adult body cell transferred to the empty egg cell; [2]

[Total: 5]

- 8 (a) white blood cells produce antibodies against the safe form of the disease / white blood cells retain a 'memory' of the disease;
if the 'real' disease is encountered these white cells can quickly produce antibodies against it [2]
- (b) (i) For:
measles can cause disability or death /
reduces disease in population;
Against:
a perceived risk of autism /
pain/trauma to child
need one for and one against for mark
accept any reasonable ideas [1]
- (ii) not a high enough % of population are vaccinated; [1]
- (iii) personal choice / not right to force people / people should be allowed to decide for themselves / some people may be inaccessible / may be too expensive [1]
- (c) (no) because:
number of cases of autism rises steeply whereas % of vaccinations does not really fluctuate/ is approximately consistent;
if there was a correlation you would see a similar rise in both autism and vaccinations [2]
- (d) virus has a high mutation rate / virus mutates quickly;
white blood cells will not recognise new form of virus / virus damages immune system [2]

[Total: 9]

Page 6	Mark Scheme: Teachers' version	Syllabus	Paper
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- 9 (a) E
D
D
D
all correct = 2
3/2 correct = 1
1 correct = 0 [2]

- (b) there is variation within a species/among offspring;
there is competition between individuals for resources/named resource;
some individuals are better adapted, more so are likely to survive to reproduce [3]

[Total: 5]