

**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

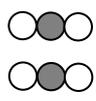
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- 1 (a) 1
78
21
all correct = 2
two or one correct = 1 [2]
- (b) (i) the range is smaller / the values are closer [1]
- (ii) the mean for the highway/45 is not within the range for the country road/6 to 9;
the mean for the country road/9 is not within 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
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- 3 (a) hydrocarbon carbohydrate amino acid
all correct = 2
two or one correct = 1
- (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]

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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]**

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- 7 (a) unspecialised cells so can develop into any type of cell
- (b) (i) B
- (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
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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]