MARK SCHEME for the October/November 2009 question paper

for the guidance of teachers

0608 21ST CENTURY SCIENCE

0608/05   Paper 5 (Comprehension, Practical Procedures,
Data Handling and Analysis), maximum raw mark 60

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UNIVERSITY *of* CAMBRIDGE
International Examinations

Section A

1 (a) (i) cold / always below 0°C [1]

(ii) 2006 [1]

(b) light (shorter λ/higher energy photons) transmitted through atmosphere (1);
Earth absorbs this energy (1);
re-emits IR/heat/longer λ radiation/lower energy photons (1);
more of this is absorbed by carbon dioxide in atmosphere (1)
Any 3 points [3]

(c) (i) 2036   2070 [2]

(ii) lack of melt water into rivers (1); e.g. 'feed'
rivers deliver less water to Asia/dry up (1);
huge population in those areas (1);
possible drought (1);
Any 3 points
allow flooding as short term problem [3]

(d) flooding of cities/farmland (1);
more detail, e.g. most people live near sea level, most productive farmland lost, destruction of roads (1)
Second mark may be example of country affected. [2]

(e) (i) explanation of correlation (1);
explanation of cause (1);
correct reference to either scientist (1)
Any 3 points [3]

(ii) A clear mechanism to explain the causal link/ further data on different possible mechanisms to show that the CO_2 mechanism is the most likely correct one. [1]

[Total: 16]

2 (a) (i) Too hot [1]

(ii) Too cold [1]

(b) closest planet / similar to Earth / most likely conditions for life [1]

(c) methane (1); water (1) [2]

(d) (i) (planets around) distant stars/stars other than Sun [1]

(ii) Atmosphere affects observations/light and other pollution (1);
space telescopes above (almost all of) atmosphere (1) [2]

(e) distance / how far (1);
light goes in one year (1) [2]

(f) (i) any suggested project, e.g. famine relief, combating AIDS (1);
argument for Earth based project (e.g. ethical argument) (1); [2]

(ii) seeking knowledge (1); source of materials on other planets (1); need for room for
population growth (1); escape environmental problems on Earth (1)
allow any two valid reasons for space research or one reason with justification [2]

[Total: 14]

Section B

3 (a) wear gloves (1); wear lab coat (1); tie hair back (1); do not remove Petri dish lid completely (1); do not breathe close to the bacteria (1); use sterile equipment (1)
accept any two reasonable suggestions, ignore goggles [2]

(b) control / to allow comparison
Not just 'fair test' [1]

(c) (i) B [1]

(ii) largest clear area [1]

(d) (i) increases reliability/can discard outliers/can calculate mean [1]

(ii) size of filter paper discs (1); length of time soaking (1); concentration of antibiotic solutions (1); time plate left for (1); conditions plate left in (1)
accept any two reasonable suggestions [2]

(e) bacteria are resistant (to antibiotic **C**) (1); antibiotic **C** is specific to another bacterium/ antibiotic **C** not specific to this bacterium (1); mutation has occurred in the genes of the bacteria (1)
Any two [2]

[Total: 10]

4 (a) (i) pipette [1]

(ii) more accurate [1]

(b) (i) 18.3   15.8   21.1
all correct = 2
two correct = 1 [2]

(ii) BAC
one mark each for: **A** after **B**; **C** after **A**; [2]

(c) (i) to avoid adding too much / to avoid missing the neutralisation point [1]

(ii) to show when the solution was neutral / to show the neutralisation point / to show when all the acid had reacted [1]

(d) the burette was used for the same solution each time (1); using the same pipette for all samples of the water containing sulfuric acid would have mixed different concentrations (1) [2]

[Total: 10]

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5 **(a)** 3 [1]

    (b) **(i)** get values due to Pa-234 alone [1]

       (ii) Data changes rapidly near the beginning (1); Data changes slowly later on (1);
need less frequent points to see significant changes later on (1)
Any two points [2]

      (iii) Taking more frequent readings (1);
repeating entire experiment and average results for each time (1); use sample with
more Pa in it (1)
Any two points [2]

    (c) **(i)** all 3 correct (2);
at least 1 correct (1) [2]

       (ii) acceptable line [1]

      (iii) Indication of half-life calculation or interpolation and compare with value at 70 s [1]

[Total: 10]