

**MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers**

5129 COMBINED SCIENCE

5129/02

Paper 2 (Theory), maximum raw mark 100

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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- 1 (a) (i) transport/carry oxygen ; [1]
- (ii) presence of haemoglobin ;
no nucleus present ;
large surface area (per volume)/biconcave disc shape ; } any 2 [max 2]
- (iii) combines with oxygen for transport/releases oxygen in the tissues ;
more haemoglobin contained within the cell/more oxygen carried ;
more oxygen can pass into the cell (in lung capillaries)/more oxygen can leave the cell (in tissue capillaries) ;
- adaptation and explanation **must** be linked correctly* [max 2]
- (b) plasma ; [1]
- 2 (a) $F = ma$ or $a = F/m$ or $0.32/0.2$;
1.6 ;
 m/s^2 (unit independent) ; [3]
- (b) 2 ; [1]
- 3 (a) 71 ; 117 ;
7.1 ; 11.7 ; (divided by 10)
2.925g (divided by 4) (ecf throughout) [4]
- (b) ionic/electrovalent ; [1]
- (c) kill bacteria/micro-organisms/germs ; [1]
- 4 (a) Nm ; [1]
- (b) force applied further from fulcrum (pivot)/perpendicular distance larger ;
smaller force gives same moment/larger moment for same force ; [2]
- 5 (a) -1 (relative charge) ;
1 (relative mass) ;
0 (relative charge) ; [3]
- (b) number of neutrons/number of nucleons/mass number ; [1]
- (c) same number of electrons in outer shell ;; [2]

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- 6 (a) (i) **B, C or D** ; [1]
- (ii) **E** ; [1]
- (b) produces (hydrochloric) acid ;
kills bacteria (on food)/prevents food poisoning ;
or
accept stores food ;
no need to eat constantly/can concentrate on other activities ; [max 2]
- (c) bile would not be added (to the food being digested) ; [1]
the fat (in the food) not emulsified ;
fat digestion would be incomplete/slow ; } any 2
stomach acid would not be neutralised ;
action of pancreatic enzymes impaired ; [max 2]
- 7 (a) aerobic (respiration) uses oxygen, anaerobic does not ; }
aerobic (respiration) releases more energy than anaerobic ; } any 2
anaerobic (respiration) produces lactic acid, aerobic does not ; }
aerobic produces carbon dioxide and water ; [max 2]
- (b) breathing becomes more rapid/faster ;
breathing becomes deeper/larger movements of chest ; [2]
- (c) (i) 1500(m) ; [1]
- (ii) the longer the distance the greater the use of aerobic respiration ; ; [2]
(accept converse or correct quoted figures)
- 8 (a) correct amplitude ;
correct wavelength ; [2]
- (b) $v = f\lambda$ **or** $\lambda = f/v$ **or** 0.5×6 ;
3.0 ; [2]
- 9 (a) copper → reacts vigorously with steam ;
magnesium → reacts vigorously with water ;
iron → no reaction ;
potassium → reacts slowly with cold water and steam ; [4]
- (b) lighted/burning splint explodes with a pop ; [2]

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- 10 root hair ;
osmosis ;
xylem ;
transpiration ; [4]
- 11 (a) ball is positively charged ;
same charges repel ; [2]
- (b) current ; [1]
- 12 (a) (i) $I = P/V$ or $P = VI$ or $60/240$;
= 0.25 ; [2]
- (ii) $E = Pt$ or $P = E/t$ or $E = VI t$ or 60×600 ;
= 36 000 ; [2]
(600 max 1 mark)
- (b) (i) microwave / radio ; [1]
- (ii) X-rays / gamma rays ; [1]
- 13 (a) methane ; [1]
- (b) **compound** of carbon and hydrogen **only** ; [2]
- (c) 13 8 10 (all three) ; [1]
- (d) (i) sulfur dioxide ; [1]
- (ii) acid rain ;
corrodes buildings / kills plant or aquatic life ; [2]

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- 14 (a) (i) Sun ; [1]
- (ii) light ; [1]
- (b) (i) 4 (herbivores) ;
5 (carnivores) ; [2]
- (ii) 6 (species) ; [1]
- (iii) energy lost at each trophic level ;
example of energy loss (respiration, heat, digestion etc.) ;
the longer the food chain, the less energy (there is to pass on) ; } any 2 [max 2]
- (c) the spider population would decline/fall/less spiders ;
spiders eat moths/less food for spiders ;
or
more grasshoppers/grasshopper population increases ;
more flowering plants/food for grasshoppers ; [max 2]
- 15 (a) $v = s/t$ **or** $400/50$;
= 8 ; [2]
- (b) direction keeps changing/velocity is directional ; [1]
- 16 (a) copper ;
zinc ; [2]
- (b) (i) cutlery/chemical plant/surgical equipment/named examples ; [1]
- (ii) mixing **metals**/adding other elements to a **metal** to change/improve properties ;
examples of changing property ; [2]
- 17 (a) energy can be neither lost nor created ; [1]
- (b) chemical ;
thermal/heat ;
kinetic ; [3]

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- 18 (a)** calcium carbonate ; [1]
- (b)** aluminium oxide ; [1]
- (c)** potassium nitrate ; [1]
- (d)** calcium carbonate ; [1]
- 19 (a)** iron (core) ;
primary and secondary (correct way round) ; [2]
- (b)** no changing current/changing magnetic field (in iron core) ;
no induced e.m.f./voltage (in secondary)/current ; [2]
- 20** time taken ;
for count rate/activity/number of nuclei to halve ; [2]