

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**5129 COMBINED SCIENCE**

**5129/21**

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.

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- 1 (a) red (cells) / erythrocytes ; [1]
- (b) A ; [1]
- (c) water has entered the cells ;  
by osmosis ;  
cells have burst ; } any 2 [2]
- 2 (a) velocity has direction / speed does not have direction ; [1]
- (b) (i) 5.6–5.8 14 (both) ; [1]
- (ii) distance = speed × time or  $s = d/t$  or  $4 \times 7$  ; [1]  
= 28 ; [1]
- (c) kinetic  
thermal / heat / sound (in order) ;; [2]
- 3 (a) alkanes ; [1]
- (b) 64 44 ;; [2]  
6.4 4.4 (divide both by 10) ecf ; [1]  
1.1 (divide by 4) ecf ; [1]
- (c) glowing splint ;  
relights (incorrect test = 0 marks) ; [2]
- 4
- |     |               |
|-----|---------------|
|     | 1 ;           |
| 1 ; | 0 / neutral ; |
- [3]
- 5 (a) muscle ; [1]
- (b) (i) opens ; [1]
- (ii) closes ; [1]
- (c) pressure rises ;  
blood forced out / leaves ; [2]

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(d) blood (in chamber Z) has less oxygen / is deoxygenated ;  
 blood (in chamber Z) has more carbon dioxide ;  
 [or reverse argument if no chamber stated assume Z] [2]

6 (a) (i) normal in correct position, perpendicular ; [1]

(ii) ray looks as if coming from pin image left of mirror ; [1]

(b) left / towards mirror / nearer the mirror ; [1]

(c) sound / p-waves / push wave on a slinky ; [1]

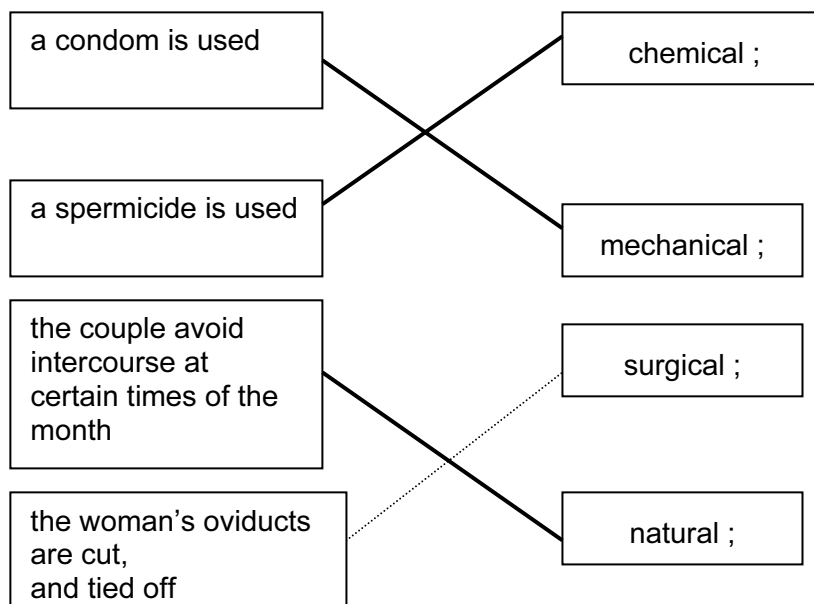
7 (a) shared pair ;  
 three lone pairs on each chlorine atom ; [2]

(b) increases / higher / bigger ; [1]

(c) purification of water ; [1]

(d) potassium chloride / KCl ;  
 iodine / I<sub>2</sub> (either order) ; [2]

8 (a) (i)



[3]

(ii) the (contraceptive) pill ; [1]

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- (iii) condom / abstinence ;  
prevents body (fluid) contact / provides barrier ; [2]
- (b) the milk is sterile ;  
contains correct (balance of) nutrients ;  
no danger of being made up at the wrong concentration ;  
contains antibodies / provides immunity ;  
at right temperature ;  
promotes bonding between mother and baby ;  
is always / available for the baby / no preparation ; } any 2 [2]
- 9 (a) components connected in series ; [1]  
correct symbols for all four components ;; [2]  
correct symbols for two or three components (= 1 mark)
- (b) (i)  $V = IR$  or  $R = V/I$  or  $1.8/0.2$  ; [1]  
9 ; [1]  
 $\Omega$  / ohm (unit independent) ; [1]  
(correct answer with unit = 3 marks)
- (ii)  $P = VI$  or  $1.8 \times 0.2$  ; [1]  
0.36 ; [1]
- 10 (a) (i) iron / Fe ; [1]  
(ii) 3 2 ; [1]  
(iii) 8–10 ; [1]
- (b) nitric acid ;  
neutralisation / exothermic ; [2]
- 11 (a) protein ;  
catalyst ; } any 1  
speeds up reactions ; } [2]
- (b) (i) faster at higher temperature / at 40°C / best at 40°C ; [1]  
(ii) fastest / optimum at pH7 ;  
Increases to pH 7 then decreases ; [1]
- (c) line drawn below 15°C curve throughout ; [1]

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- 12 (a) conduction ; [1]
- (b) heated water expands / becomes less dense ;  
 heated (hot) water rises ;  
 cooler (cold) water falls ;  
 convection (current) ; } any 3 [3]
- (c) (i) plastic is a poor conductor / insulator ; [1]
- (ii) white surfaces are poor emitters ;  
 (ignore poor absorber / good reflector  
 but good absorber / poor reflector / conduction is incorrect) [1]
- 13 (a) condenser ; [1]
- (b) filter funnel ; [1]
- (c) measuring cylinder / burette ; [1]
- (d) pipette ;  
 burette correct order ; [2]
- 14 (a) thin wall / wall one cell thick ;  
 folded / large surface area ;  
 many capillaries / moist surface ; } any 2 [2]
- (b) carbon dioxide / CO<sub>2</sub> / water / H<sub>2</sub>O ; [1]
- (c) smoke / soot particles coat gas exchange surface ;  
 or reduce effective surface area ;  
 prevent diffusion [2]
- 15 (a) A = fermentation ;  
 B = water / steam ;  
 C = ethanoic acid ; [3]
- (b) enzymes / zymase ; [1]
- (c) addition / additional ;  
 monomer ; [2]
- 16 (a) magnetic materials are attracted to magnets ; [1]

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- (b) **steel** is a hard magnetic material ;  
**steel** retains magnetism / permanent ;  
**steel** hard to magnetise ;  
**iron** is soft magnetic ;  
**iron** easily loses magnetism / temporary ;  
**iron** easy to magnetise ;
- } any 1
- [1]

- 17 (a)  $a = F/m$  or  $225\,000/50\,000$  ; [1]  
 $= 4.5$  ; [1]  
 $m/s^2$  (unit independent) ; [1]

- (b) (spacecraft) mass / weight decreases ; [1]

- 18 (a) less (in the cheetahs) ; [1]

- (b) energy losses at each stage ; [1]

- (heat loss due to) respiration ;  
not all organisms being eaten ;  
(energy losses due to) egestion / excretion / movement ;
- } any 1
- 1
- [1]

- (c) decomposers / bacteria / fungi / microorganisms ; [1]

- 19 (a) **S** ; [1]

- (b) **T** ; [1]

- (c) **R** ;  
**T** (either order) ; [2]

- (d) **W** (accept **U**) ; [1]