

M1. (a) (sound waves) which have a frequency higher than the upper limit of hearing for humans

or

a (sound) wave (of frequency) above 20 000 Hz

sound waves that cannot be heard is insufficient

a wave of frequency 20 000 Hz is insufficient

1

(b) 640

an answer of 1280 gains 2 marks

allow 2 marks for the correct substitution

ie 1600×0.40 provided no subsequent step

allow 2 marks for the substitution $\frac{1600 \times 0.80}{2}$

provided no subsequent step

allow 1 mark for the substitution 1600×0.80 provided no subsequent step

allow 1 mark for the identification that time (boat to bed) is 0.4

3

(c) any **one** from:

- pre-natal scanning / imaging
- imaging of a named organ (that is not surrounded by bone), eg stomach, bladder, testicles

accept heart

*do **not** allow brain **or** lungs (either of these negates a correct answer)*

- Doppler scanning blood flow

1

(d) advantage

any **one** from:

- (images are) high quality or detailed or high resolution
clearer / better image is sufficient
- (scan) produces a slice through the body
- image can be viewed from any direction
allow images are (always) 3D / 360°
- an image can be made of any part (inside the body)
allow whole body can be scanned
- easier to diagnose **or** see a problem (on the image)

1

disadvantage

any **one** from:

- (the X-rays used **or** scans) are ionising
allow a description of what ionising is

- mutate cells **or** cause mutations **or** increase chances of mutations
allow for cells:
DNA / genes / chromosomes / nucleus / tissue
- turn cells cancerous **or** produce abnormal growths **or** produce rapidly growing cells
- kill cells
damage cells is insufficient
- shielding is needed
can be dangerous (to human health) unqualified, is insufficient

1

[7]

- M2.** (a) (i) air resistance/drag/friction (or upthrust)
weight/gravitational pull/gravity
for 1 mark each 1
- (ii) air resistance/friction acts in opposite direction to motion 1
- (iii) Y 1
- (iv) the sky-diver accelerates/his speed increases
in downward direction/towards the Earth/falls
for 1 mark each 2
- (b) force X has increased force Y has stayed the same the speed of the sky-diver
will stay the same
for 1 mark each 3
- (c) (i) CD 1
- (ii) 500 }
(iii) 50 } (but apply e.c.f. from (i)) 3
- (iv) 10 (but apply e.c.f. from (ii) and (iii))
gets 2 marks
- or 500/50 or d/t
gets 1 mark 2

[14]

M3. (a) (i) 3km [allow 2.9 to 3.1]
for 1 mark

1

(ii) 6.6 min [allow 6.5 to 6.8]
for 1 mark

1

(b) can be in any units, 1.5 km/min, 1500 m/min, 25 m/s, 90 km/h
Sp = d/t
=12/8
=1.5
km/min

for 1 mark each (see marking of calculations)

4

[6]

M4.	(a) (i) Constant speed	2
	(ii) Accelerates to higher constant speed	1
	(b) (i) Points correct (allow one major or two minor mistakes) Line correct (for their points)	2
	(ii) 5 m/s or 5 <i>gets 2 marks</i> or correct unit <i>gets 1 mark mark</i>	3
	(c) (i) 50 s or 50 <i>gets 2 marks</i> or $t = d/v$ <i>gets 1 mark</i>	3
	(ii) Line correct (of gradient 4 and spans 30 consecutive seconds)	1
	(d) (i) 0.04 or 6/15 <i>gets 2 marks</i> or $a = v/t$ <i>gets 1 mark</i>	3

[15]


M5. (i) C and D **or** D and C
accept CD
accept DC
accept answers in terms of time 1


(ii) any **one** from:
 streamline position streamline clothes
accept crouched position
accept tight clothes
accept design of cycle
accept cycle slower 1

(iii) 0.5 hours **or** 30 minutes **or** 1800 seconds
must have unit 1

(iv) speed = $\frac{\text{distance}}{\text{time (taken)}}$

accept any correct rearrangement
*accept $s = d/t$ **or** $v = s/t$*
accept velocity for speed

accept 

if subsequent use of  correct 1

(v) 16
allow for mark for each of time = 3.5 hours
distance = 56km
allow e.c.f. from part (a)(iii) if correctly used
an answer of 14 gains 2 marks
allow 1 mark for correct attempt to average the three sections 3

M6. (a) 96

*allow 1 mark for correct substitution
ie 80×1.2*

2

newton or N

*allow Newton
do **not** allow n*

1

(b) (i) direction

1

(ii) velocity and time are continuous (variables)

*answers must refer to both variables
accept the variables are continuous / not categoric
accept the data / 'it' is continuous
accept the data / 'it' is not categoric*

1

(iii) C

1

velocity is not changing

*the 2 marks for reason may be scored even if A or B are
chosen*

accept speed for velocity

accept speed is constant (9 m/s)

*accept **not** decelerating*

*accept **not** accelerating*

accept reached terminal velocity

1

forces must be balanced

accept forces are equal

accept arrows are the same length / size
or
resultant force is zero
*do **not** accept the arrows are equal*

1

[8]

M7. (a) B

reason only scores if B is chosen

1

gradient / slope is the steepest / steeper
answers must be comparative
accept steepest line
ignore greatest speed

1

(b) (velocity includes) direction
'it' refers to velocity

1

[3]