1 Fig. 2.1 shows a person sitting in a room. A thermometer shows the temperature of the room.

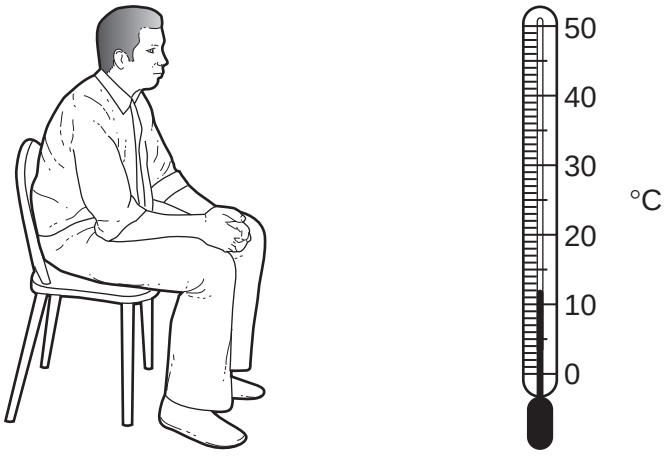

Fig. 2.1

(a) Give three uses of energy in the body of the person in Fig. 2.1.

1. .....

2. .....

3. ..... [3]

(b) Name the process carried out by the person in Fig. 2.1 that releases energy.

..... [2]

(c) The person leaves the room and runs very fast for 200 m. When the person stops running, his breathing rate and his heart rate remain high.

Explain why the person's breathing rate and heart rate remain high after the run.

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..... [4]

(d) There are changes in the skin at the beginning of the run and during the run. These changes involve the blood vessels and the sweat glands.

Describe what happens to the blood vessels and sweat glands at the beginning of the run and during the run.

Explain why these changes happen.

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..... [5]

[Total: 14]

2 **(a** State, using chemical symbols, the equation for aerobic respiration.

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[3]

A student compared the respiration of germinating mung bean seeds with pea seeds using the apparatus shown in Fig. 3.1.

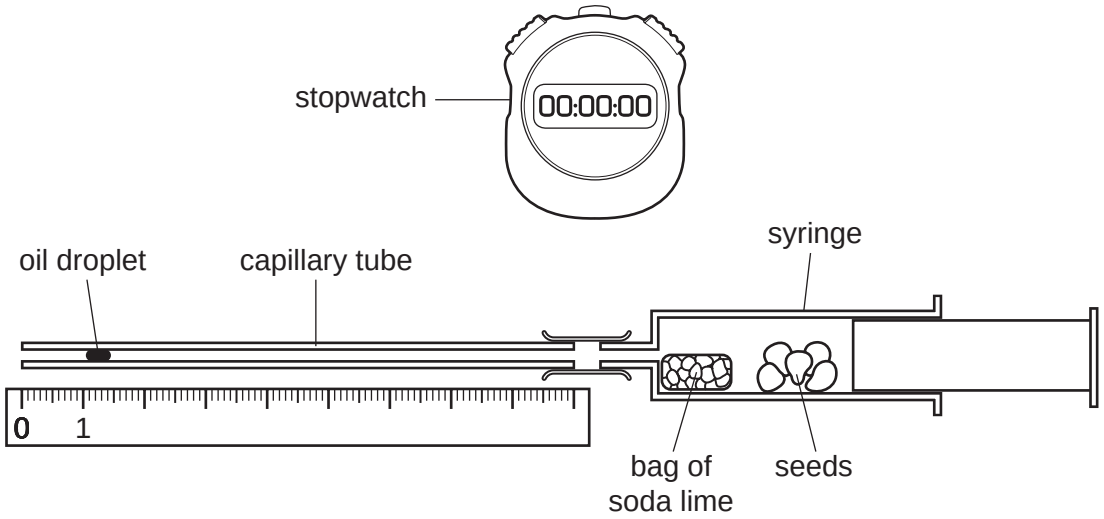

Fig. 3.1

The soda lime absorbs any carbon dioxide released by the germinating seeds. The student recorded the position of the oil droplet every minute over a period of six minutes.

(b) State three variables that should be kept constant in this investigation.

1 .....

2 .....

3 ..... [3]

(c) Table 3.1 shows the student's results.

Table 3.1

time / minute	germinating mung bean seeds		germinating pea seeds	
	position of droplet / mm	distance moved / mm per minute	position of droplet / mm	distance moved / mm per minute
0	0	0	0	0
1	12	12	10	10
2	23	11	19	9
3	36	13	28	9
4	45	9	33	5
5	48	3	36	3
6	48	0	36	0

(i) State which way the droplet moves **and** explain your answer.

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..... [3]

(ii) State what happens to the movement of the droplet after three minutes **and** suggest an explanation.

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..... [2]

[Total: 11]

3 **(a)** Define the term *aerobic respiration.*

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..... [2]

During exercise the movement of the ribcage enables air to enter the lungs.

(b) Describe how the ribcage is moved during inspiration (breathing in) and explain how this causes air to enter the lungs.

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..... [4]

(c) Explain how the ribcage returns to its resting position during expiration (breathing out).

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..... [2]

Some students carried out an investigation on a 16-year old athlete. Table 3.1 shows the results of their investigation on the athlete's breathing at rest and immediately after 20 minutes of running.

Ventilation rate is the volume of air taken into the lungs per minute.

Table 3.1

	at rest	immediately after 20 minutes of running
rate of breathing / breaths per minute	12	20
average volume of air taken in with each breath / dm^3	0.5	3.5
ventilation rate / dm^3 per minute	6.0	.....

(d) Calculate the ventilation rate of the athlete immediately after 20 minutes of running.

Write your answer in Table 3.1. [1]

(ii) Explain why the athlete has a high ventilation rate **after the exercise has finished**.

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[Total: 14]

4 **(a** In the space below write a balanced chemical equation for anaerobic respiration in muscles.

…….. → ……..…….. [2]

Some students investigated the breathing of a 16-year old male athlete. Fig. 3.1 shows the pattern of his breathing for 60 seconds when resting. Fig. 3.2 shows the pattern of his breathing while he took some exercise for 60 seconds.

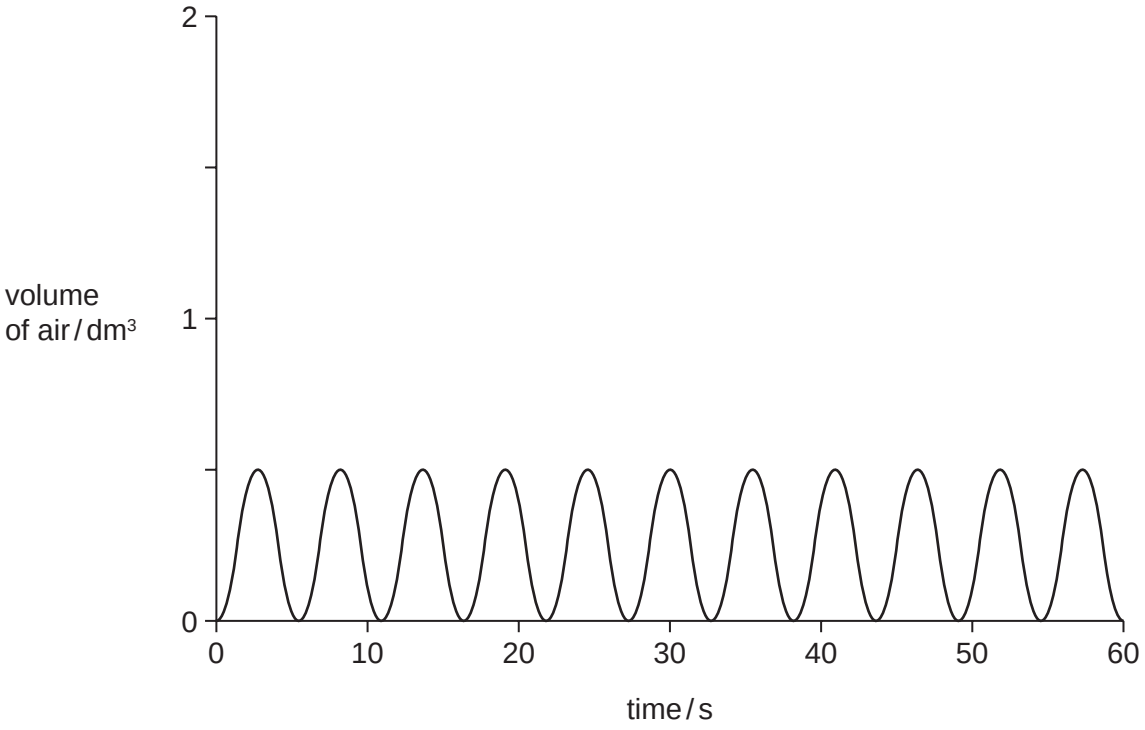

Fig. 3.1

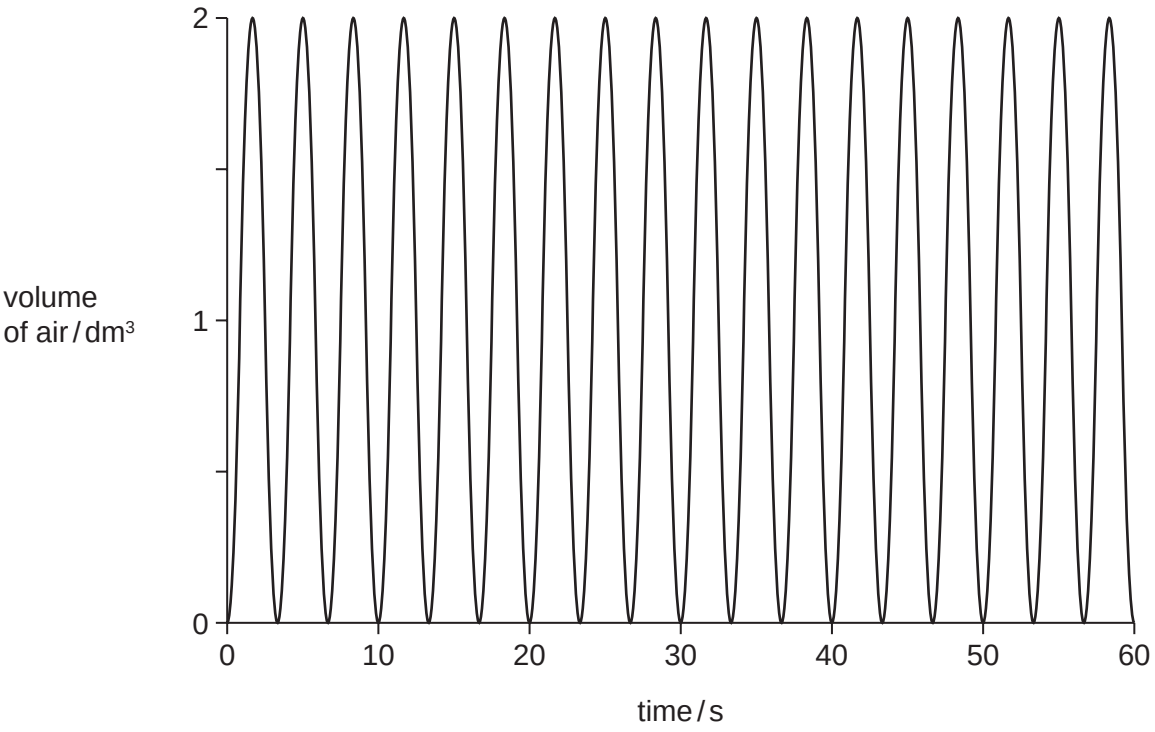

Fig. 3.2

Table 3.1 shows a summary of the results obtained by the students.

Table 3.1

	breathing at rest	breathing during exercise
volume of air breathed in with each breath / dm^3	0.5	……
rate of breathing / number of breaths per minute	11	……
volume of air breathed in per minute / dm^3	5.5	……

(b) Using information from Fig. 3.2, complete Table 3.1.

Write your answers in Table 3.1. [3]

(c) Explain the effect of exercise on the student's breathing.

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..... [5]

(d) During strenuous exercise, the hormone adrenaline causes changes in the pulse rate and in the concentration of glucose in the blood.

Explain the importance of these changes during strenuous exercise.

pulse rate .....

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concentration of glucose in the blood .....

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..... [5]

[Total: 15]