






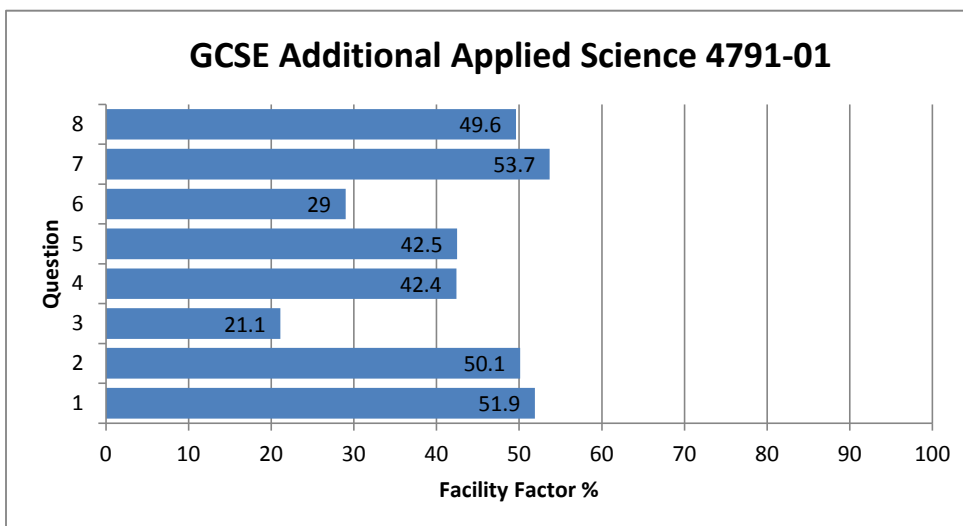


GCSE Additional Applied Science 4791-01

All Candidates' performance across questions

 Question Title	 <i>N</i>	 <i>Mean</i>	 <i>SD</i>	 <i>Max Mark</i>	 <i>FF</i>	 <i>Attempt %</i>
1	481	2.6	1.2	5	51.9	100
2	480	3	1.3	6	50.1	99.8
3	473	1.3	1.2	6	21.1	98.3
4	480	3.4	2	8	42.4	99.8
5	476	3.4	1.9	8	42.5	99
6	480	2.6	1.6	9	29	99.8
7	480	5.4	2.1	10	53.7	99.8
8	479	4	1.8	8	49.6	99.6



3. Plant growers use trials to enable them to improve output.

- (i) In one trial, growers investigated whether the rate of germination (when seeds sprout and begin to grow) is affected by storing the seeds at a low temperature (5°C) before planting them.

Three groups of 100 seeds were stored as shown in the table below **before** planting.

The table shows the numbers of seeds that germinated at 10-day intervals **after** planting.

Group	Treatment	Number of seeds germinating after:						
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B	Stored at 5°C for 40 days before planting	0	0	0	0	2	9	10
C	Not stored at a low temperature before planting	0	0	0	0	0	0	0

State **three** conclusions the growers made from their results. [3]

1.
2.
3.

- (ii) Plants make food by photosynthesis.

Once germinated, the seedlings were grown under cover as shown in the photograph below.



Explain how using fluorescent lighting and gas burners affects the rate of photosynthesis. [3]

.....

.....

.....

4791 010003

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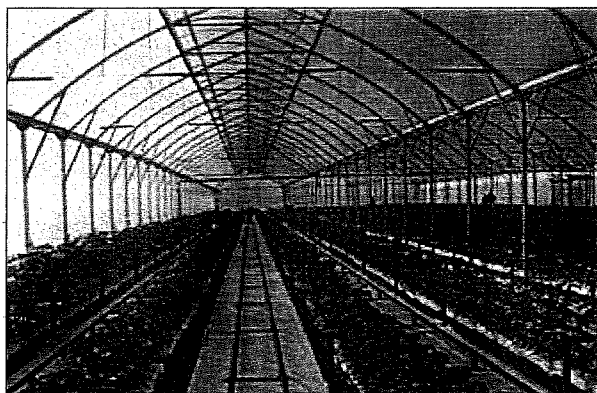
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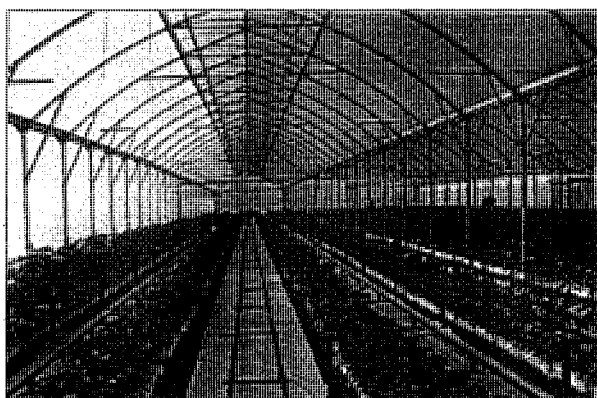
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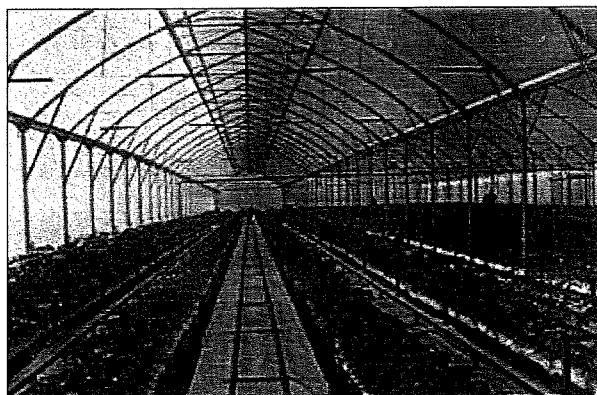
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1. after 120 days stored 5°C 116 seeds
2. for 40 days 2 seeds
3. no seed growed.

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fluorescent lighting acts like Sun and the gas burner give off carbon dioxide.

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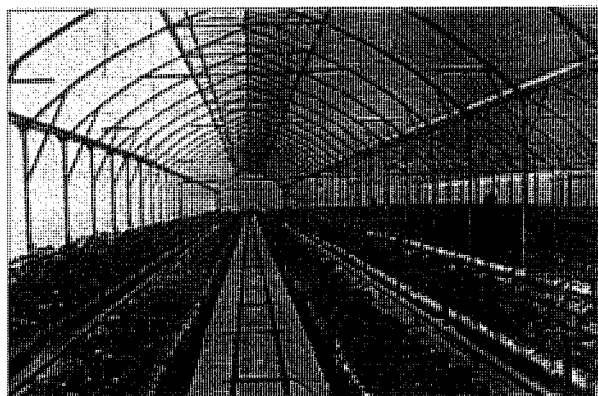
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1

6

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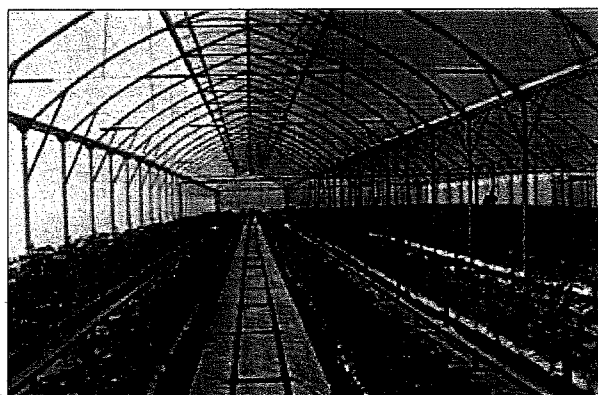
State **three** conclusions the growers made from their results.

[3]

1. Stored at 5°C for 120 days seeds germinate quicker
2. 5°C for 40 days won't germinate until 40 days after.
3. Not stored at a low temperature won't germinate

- (ii) Plants make food by photosynthesis.

Once germinated, the seedlings were grown under cover as shown in the photograph below.



Explain how using fluorescent lighting and gas burners affects the rate of photosynthesis.

[3]

Fluorescent lighting and gas burners affect photosynthesis because the lighting help the seeds grow quicker.

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State **three** conclusions the growers made from their results.

[3]

2

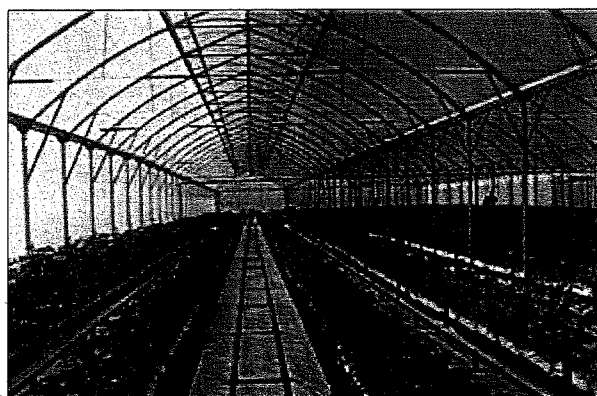
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010003

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[3]

0

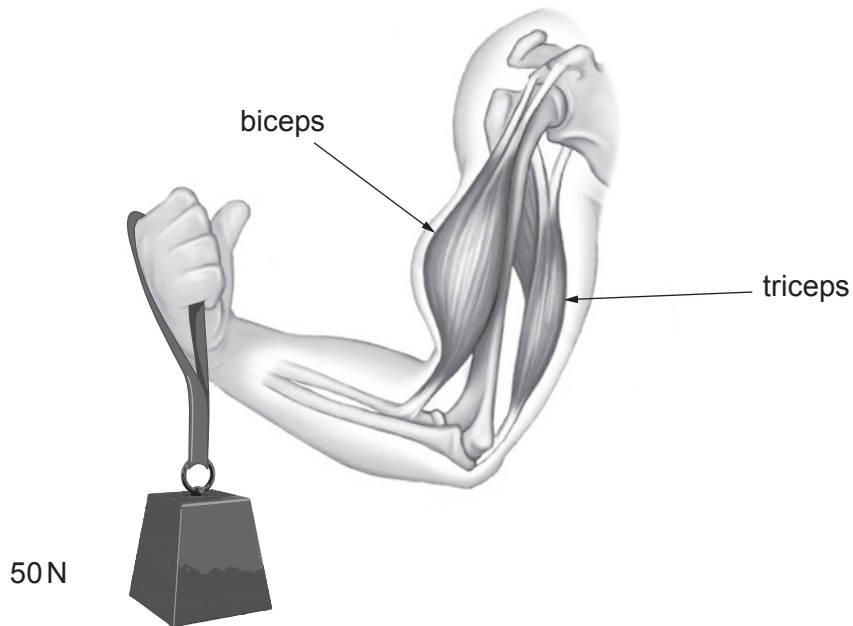
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2

6

4. The diagram shows an arm lifting a weight.



(a) (i) Describe what happens to the biceps and triceps when the arm lifts the weight. [2]

.....

(ii) Describe the changes to these muscles when the arm straightens. [2]

.....

(b) When the arm lifts a weight it is acting as a lever.

The perpendicular distance from the weight to the elbow joint is 40 cm. The perpendicular distance from the biceps muscle to the elbow is 5 cm.

(i) Calculate the moment of the 50 N weight using the equation: [2]

Moment = force × perpendicular distance between force and point of turning

Moment = N cm

(ii) To hold the weight in the position shown, the moment created by the biceps must be equal to the moment of the weight.

I. Give **one** reason why the biceps must produce a force bigger than the weight. [1]

.....

.....

II. Circle the force created by the biceps when lifting the weight. [1]

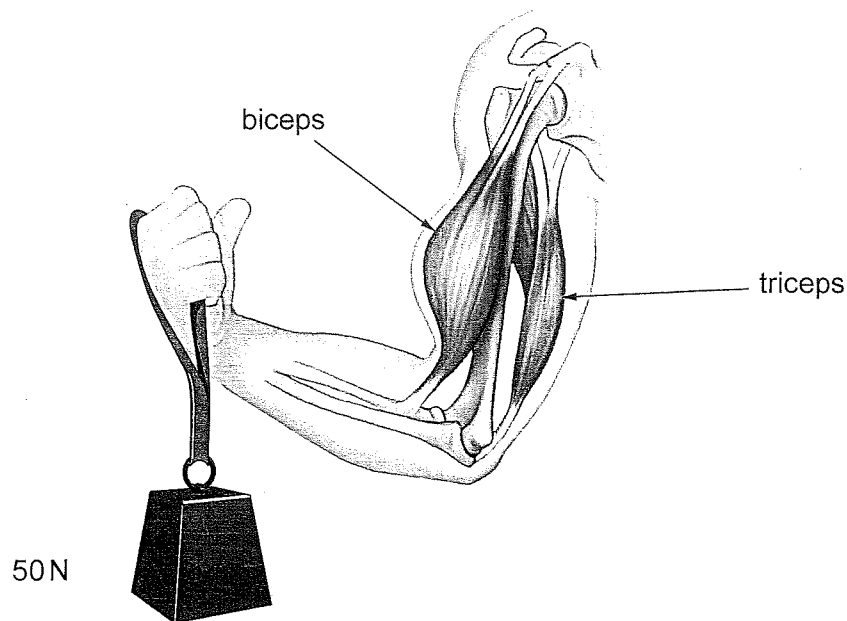
40 N

400 N

4000 N

8

4. The diagram shows an arm lifting a weight.



- (a) (i) Describe what happens to the biceps and triceps when the arm lifts the weight. [2]

The bicep contracts and the tricep relaxes when lifting the weight

- (ii) Describe the changes to these muscles when the arm straightens. [2]

The bicep relaxes and the tricep contracts when putting the arm straight

- (b) When the arm lifts a weight it is acting as a lever.

The perpendicular distance from the weight to the elbow joint is 40 cm. The perpendicular distance from the biceps muscle to the elbow is 5 cm.

- (i) Calculate the moment of the 50 N weight using the equation: [2]

Moment = force \times perpendicular distance between force and point of turning

$$40 \times 5 = \cancel{200} \quad 200$$

$$50 \times \cancel{40} \div 5 =$$

Moment = ~~200~~ N cm
400

(ii) To hold the weight in the position shown, the moment created by the biceps must be equal to the moment of the weight.

- I. Give **one** reason why the biceps must produce a force bigger than the weight. [1]

Because the bicep is using all the force to lift up the weight

- II. Circle the force created by the biceps when lifting the weight. [1]

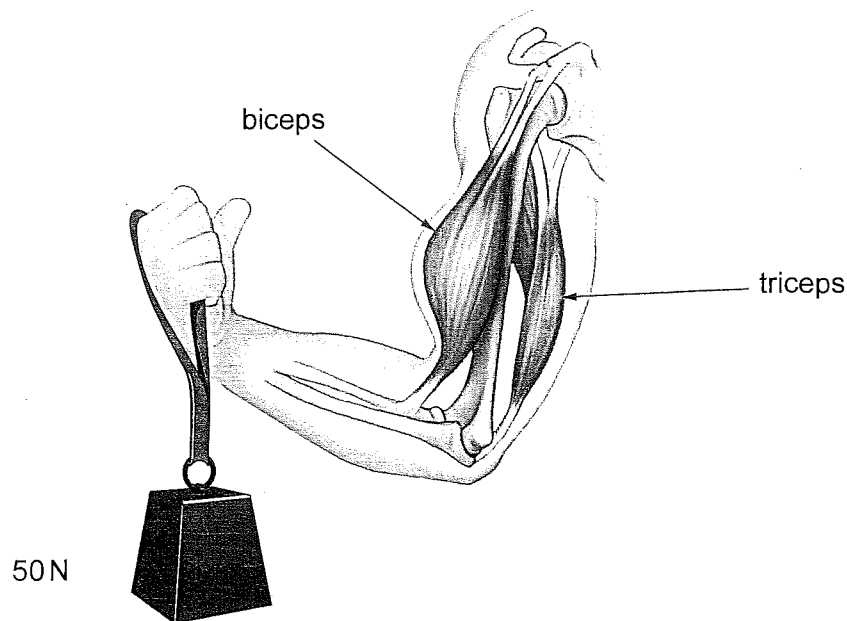
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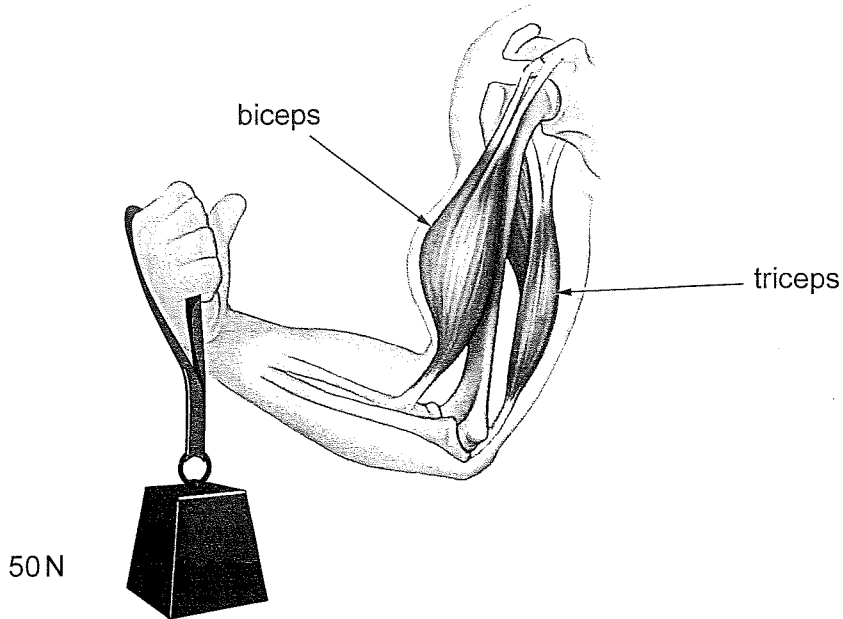
0

1

5

8

4. The diagram shows an arm lifting a weight.



(a) (i) Describe what happens to the biceps and triceps when the arm lifts the weight. [2]

When the arm lifts the weight the biceps will become hard and the triceps becomes soft.

(ii) Describe the changes to these muscles when the arm straightens. [2]

When arm straightens the triceps becomes hard and biceps become soft.

(b) When the arm lifts a weight it is acting as a lever.

The perpendicular distance from the weight to the elbow joint is 40 cm. The perpendicular distance from the biceps muscle to the elbow is 5 cm.

(i) Calculate the moment of the 50 N weight using the equation: [2]

Moment = force \times perpendicular distance between force and point of turning

$$\begin{array}{r}
 8 \quad 4 \quad 5 \\
 12 \quad 4 \quad 5 \\
 16 \quad 4 \quad 5 \\
 20 \quad 4 \quad 5 \\
 + \quad 4 \quad 5 \\
 \hline
 22 \quad 5 \quad 0 \\
 2
 \end{array}$$

Moment = ~~2000~~ ~~2000~~ ~~2000~~ Ncm

(ii) To hold the weight in the position shown, the moment created by the biceps must be equal to the moment of the weight.

- I. Give **one** reason why the biceps must produce a force bigger than the weight. [1]

*then its easier to lift than
the weight*

- II. Circle the force created by the biceps when lifting the weight. [1]

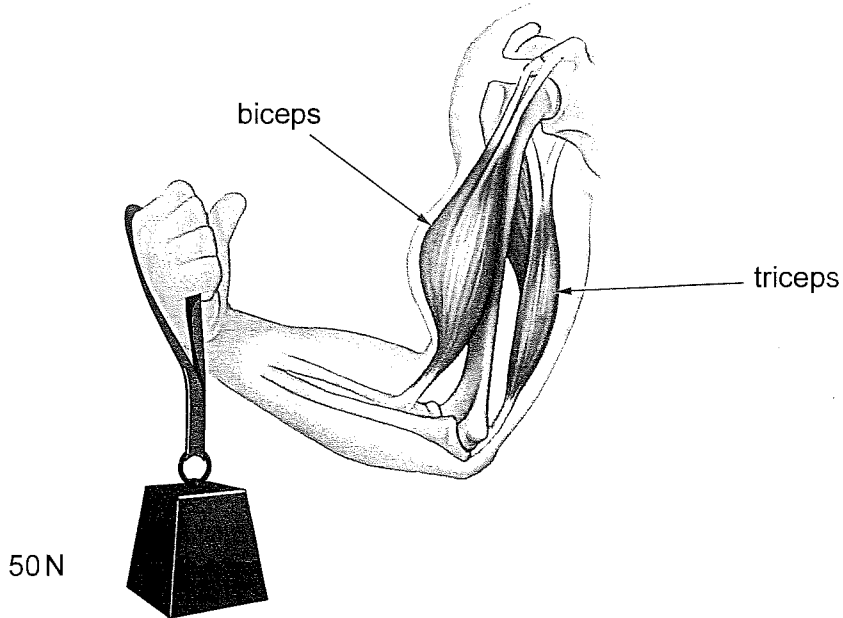
40 N

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8

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Handwritten calculation for moment:

$$\begin{array}{r}
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 2
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Moment = ~~2000~~ ~~2000~~ ~~2000~~ 2250 Ncm

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- I. Give **one** reason why the biceps must produce a force bigger than the weight. [1]



then its easier to lift
the weight

- II. Circle the force created by the biceps when lifting the weight. [1]

40 N

400 N

4000 N



Examiner
only

0

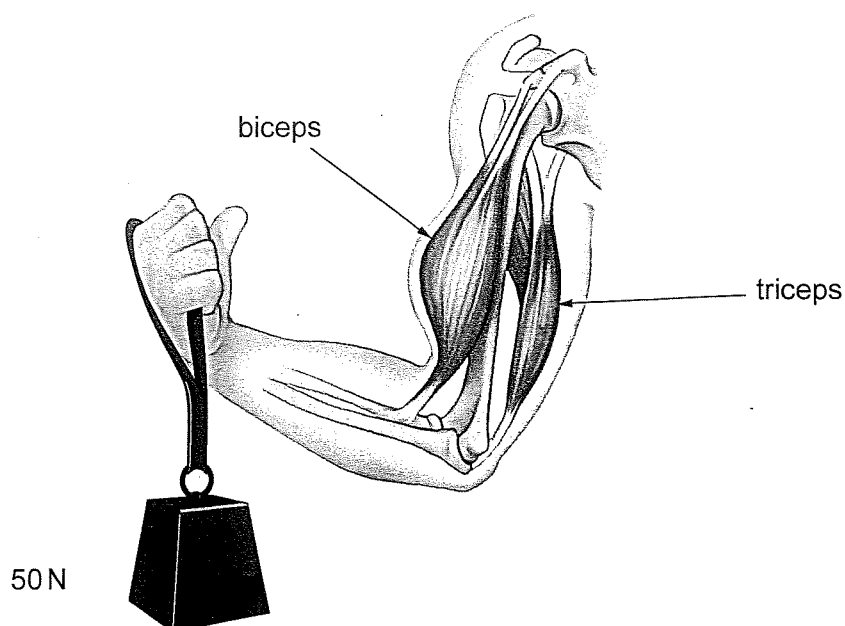
1

3

8

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The perpendicular distance from the weight to the elbow joint is 40 cm. The perpendicular distance from the biceps muscle to the elbow is 5 cm.

- (i) Calculate the moment of the 50 N weight using the equation: [2]

Moment = force \times perpendicular distance between force and point of turning

$$5 \times 50 = 250$$

Moment = 250 N cm

(ii) To hold the weight in the position shown, the moment created by the biceps must be equal to the moment of the weight.

- I. Give **one** reason why the biceps must produce a force bigger than the weight. [1]

It otherwise the bicep won't be able to lift the weight if not enough force given.

- II. Circle the force created by the biceps when lifting the weight. [1]

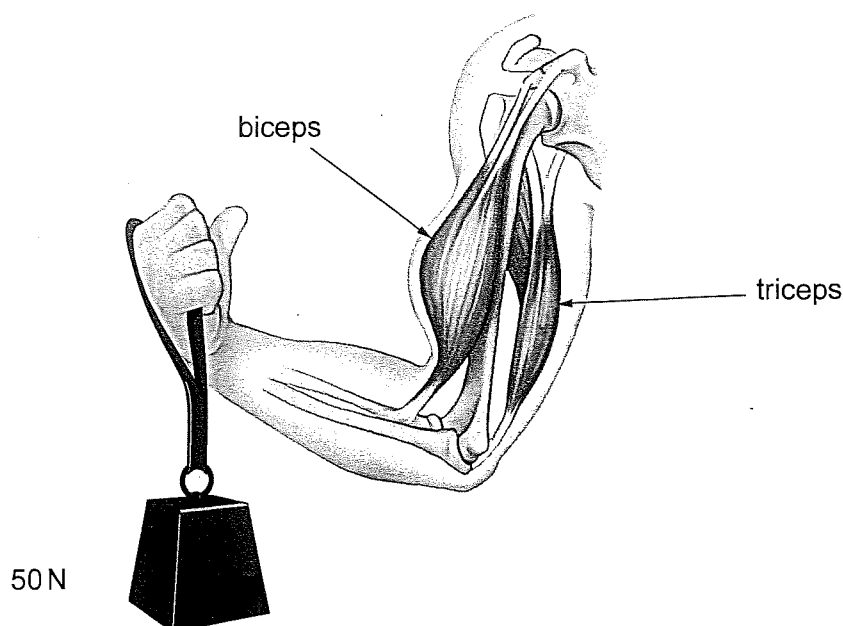
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40N

400N

4000N



5

8

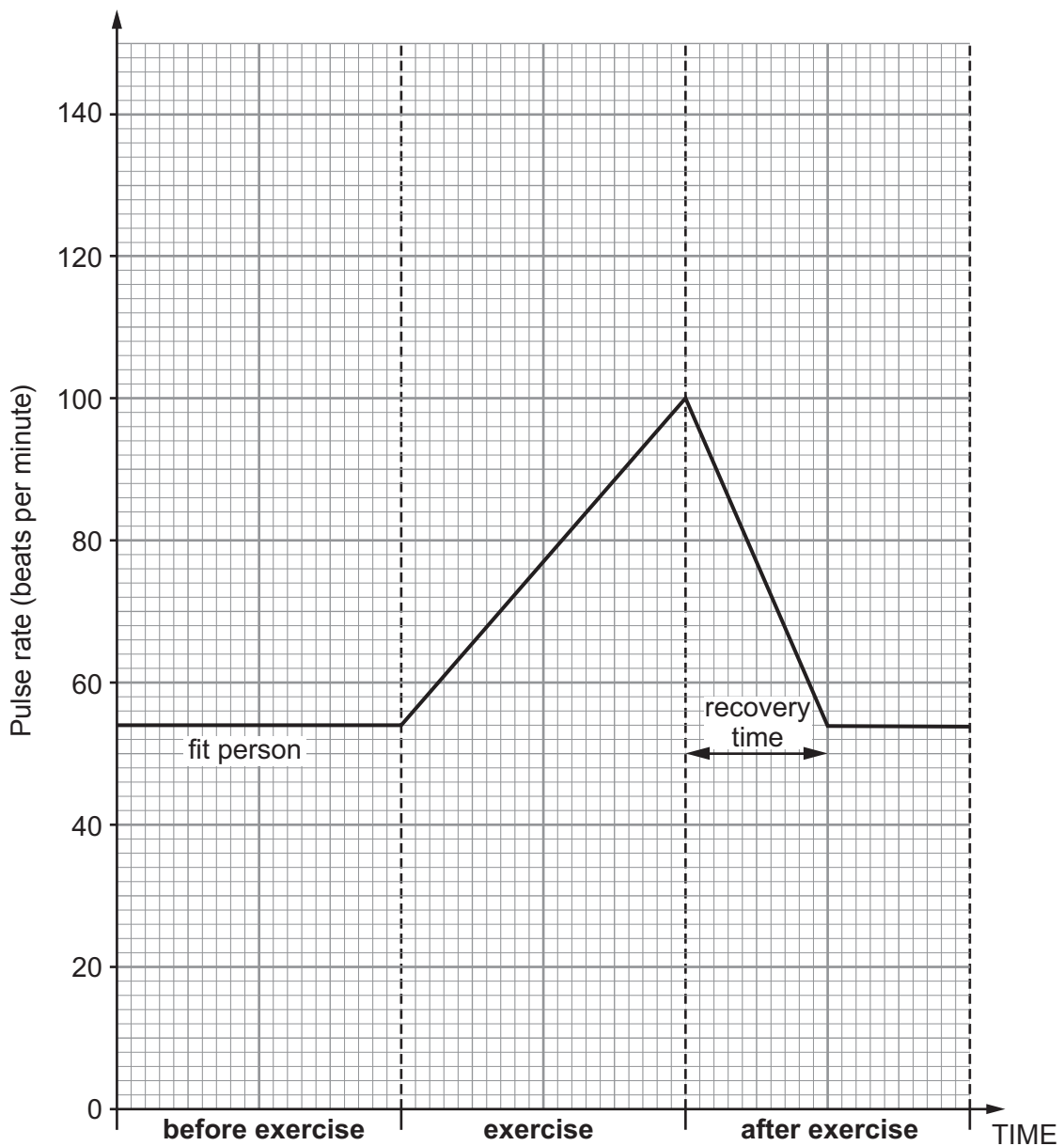
7. When members join a gym, their personal trainer will record basic information about them. One of these is pulse rate.

(a) Name **two** other body measurements that will be collected during the initial health check. [2]

1.

2.

(b) The graph below shows how the pulse rate for a fit person changes during the labelled time intervals.



- (i) An unfit person has a normal resting pulse rate of 80 beats per minute before exercise. During exercise, the pulse rate rises to 140 beats per minute. The pulse rate returns to normal by the end of the 'after exercise' time interval.

Plot the information for the unfit person on to the graph on the previous page. [3]

- (ii) Compare the pulse rate for the fit person with the unfit person for the time shown on the graph. [3]

.....

.....

.....

.....

- (c) (i) State the name of the **group** of exercises (including cycling and running) that the unfit person needs to do, to eventually reduce their resting pulse rate. [1]

..... exercise

- (ii) Give **one** reason for your answer. [1]

.....

.....

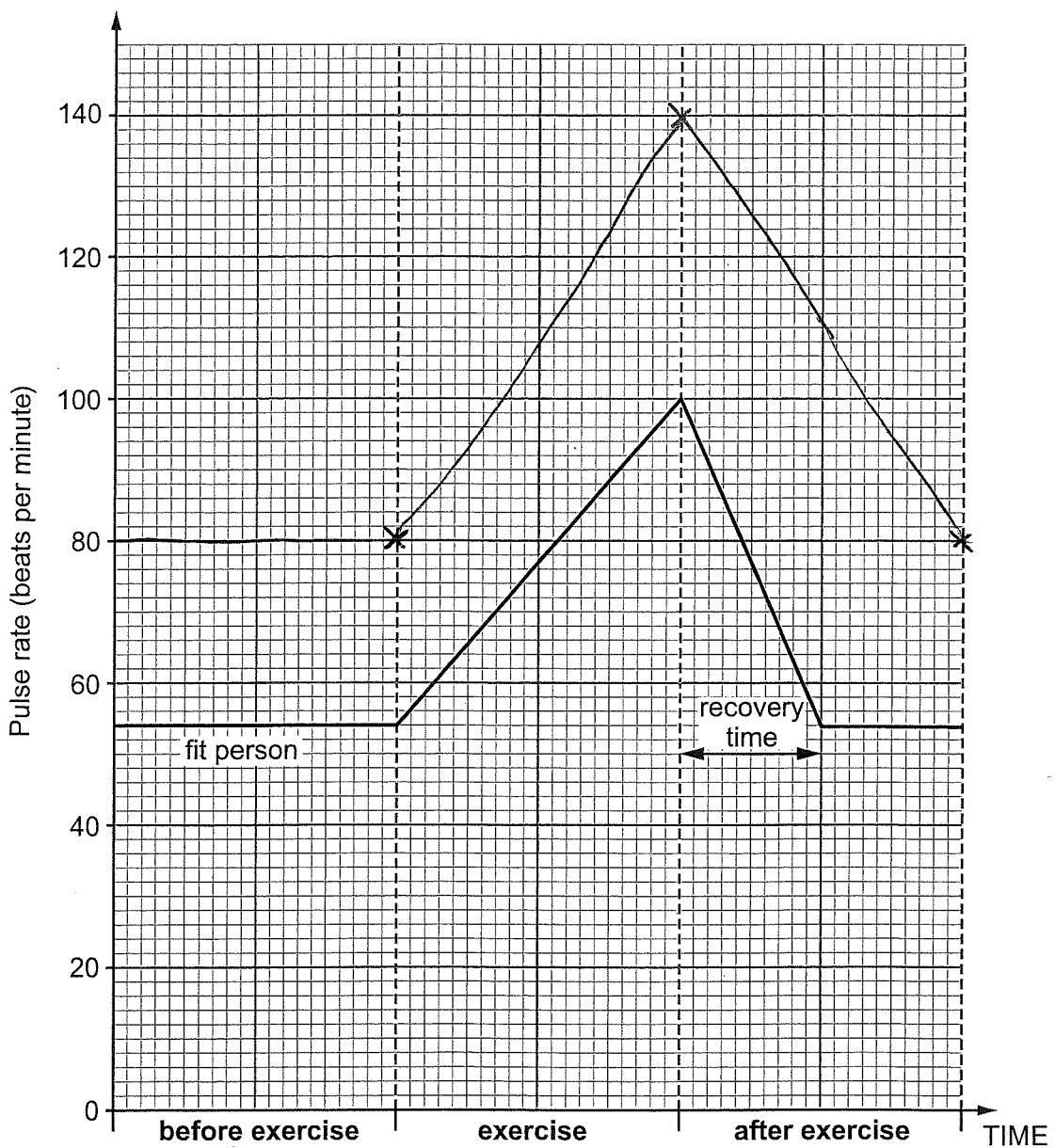
10

7. When members join a gym, their personal trainer will record basic information about them. One of these is pulse rate.

(a) Name **two** other body measurements that will be collected during the initial health check. [2]

1. B.M.I
2. how fit they are

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- (ii) Compare the pulse rate for the fit person with the unfit person for the time shown on the graph. [3]

The unfit person's heart rate goes up by a big amount. This means he/she need too much recovery time to get their heart rate back to normal.

- (c) (i) State the name of the **group** of exercises (including cycling and running) that the unfit person needs to do, to eventually reduce their resting pulse rate. [1]

~~cardio~~ ~~stretches~~ exercise
Stretches

- (ii) Give **one** reason for your answer. [1]

This gives them time to cool down and get their heart rate back to its original beat.

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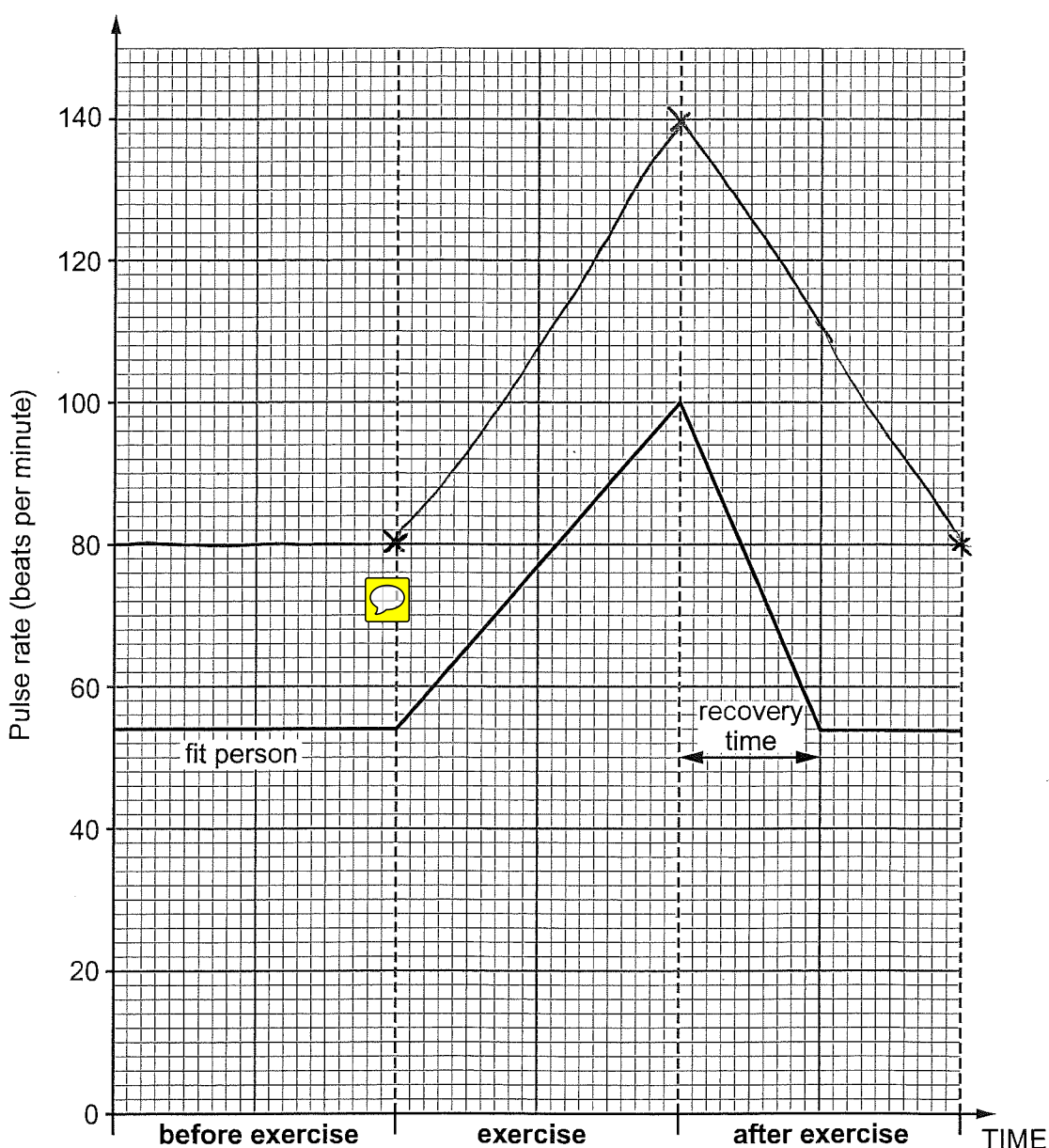
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3

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0



~~cardio~~ ~~stretches~~ exercise

Stretches

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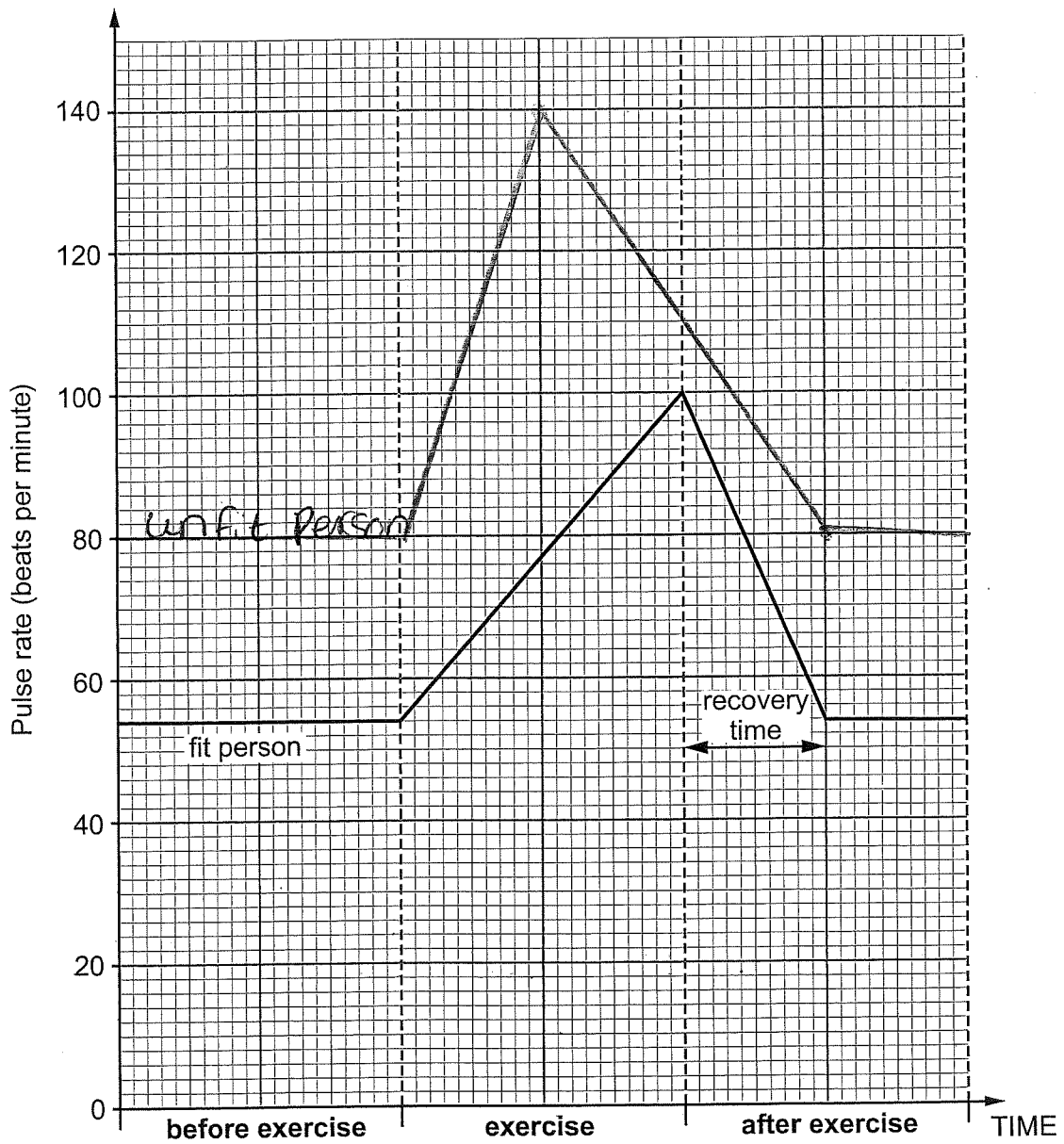
10

7. When members join a gym, their personal trainer will record basic information about them. One of these is pulse rate.

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1. body mass
2. age

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on this graph this show us the fit person don't rise as ~~high~~ high as the ~~fit~~ unfit person.

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Antarctic exercise

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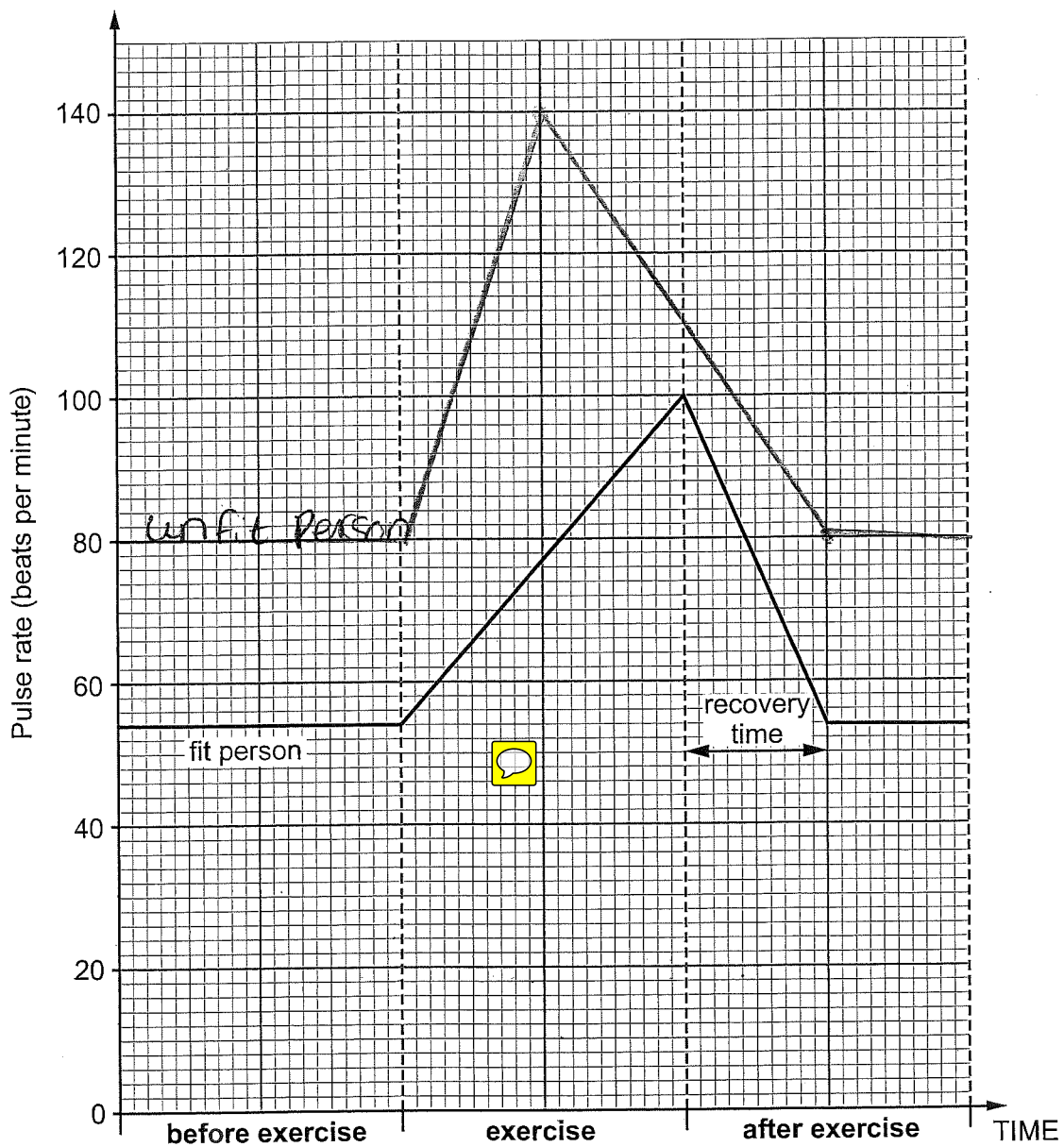
because they can just walk or jog, ~~medicines~~

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2. age

(b) The graph below shows how the pulse rate for a fit person changes during the labelled time intervals.



- (i) An unfit person has a normal resting pulse rate of 80 beats per minute before exercise. During exercise, the pulse rate rises to 140 beats per minute. The pulse rate returns to normal by the end of the 'after exercise' time interval.

Plot the information for the unfit person on to the graph on the previous page. [3]

- (ii) Compare the pulse rate for the fit person with the unfit person for the time shown on the graph. [3]

on this graph this show us the fit person don't rise as ~~high~~ high as the ~~fit~~ unfit person.

- (c) (i) State the name of the **group** of exercises (including cycling and running) that the unfit person needs to do, to eventually reduce their resting pulse rate. [1]

Antarctic exercise

- (ii) Give **one** reason for your answer. [1]

because they can just walk or jog, ~~medans~~

3

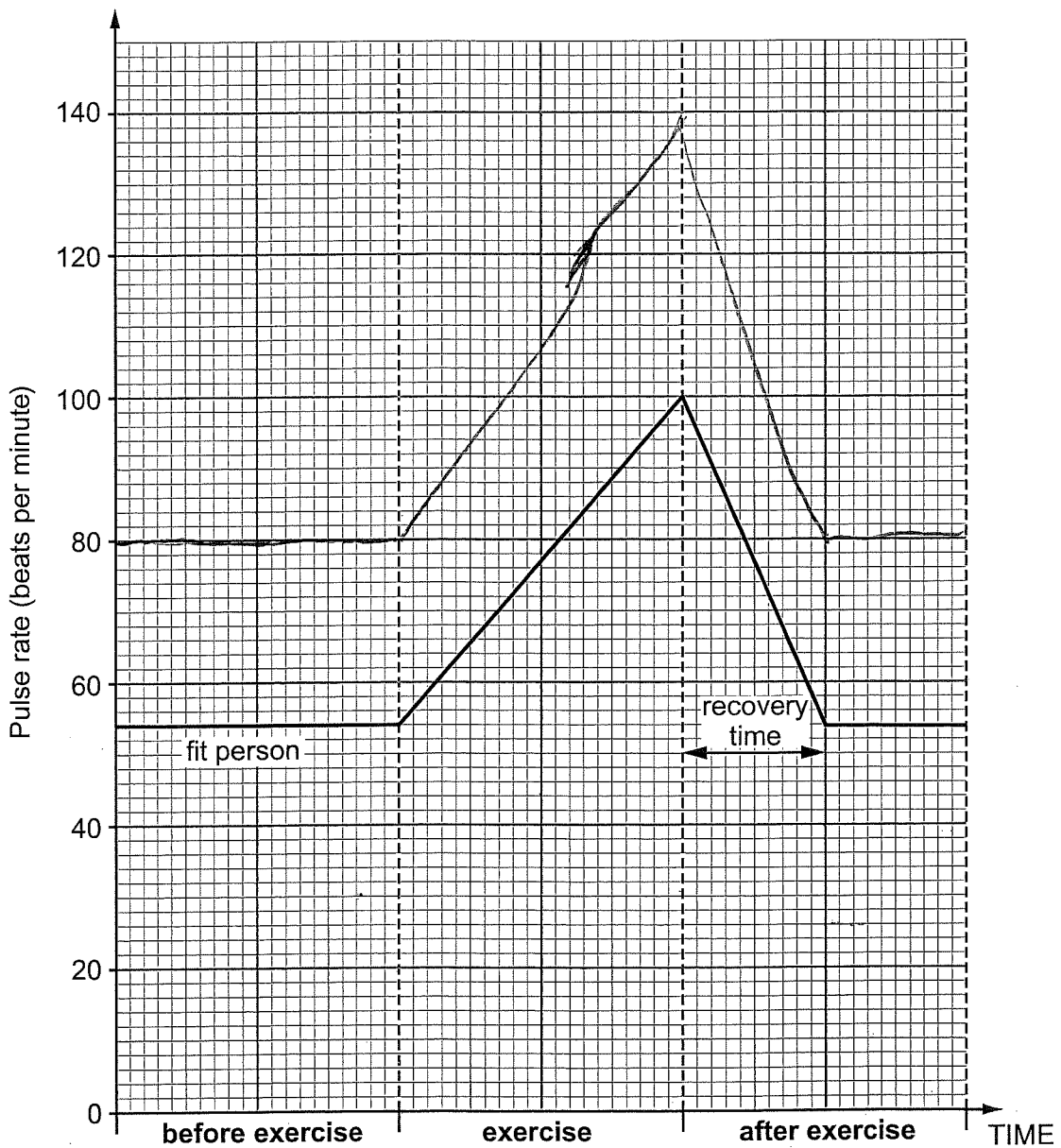
10

7. When members join a gym, their personal trainer will record basic information about them. One of these is pulse rate.

(a) Name **two** other body measurements that will be collected during the initial health check. [2]

1. *flexed rate*
2. *medical e.g heart problems*

(b) The graph below shows how the pulse rate for a fit person changes during the labelled time intervals.



- (i) An unfit person has a normal resting pulse rate of 80 beats per minute before exercise. During exercise, the pulse rate rises to 140 beats per minute. The pulse rate returns to normal by the end of the 'after exercise' time interval.

Plot the information for the unfit person on to the graph on the previous page. [3]

- (ii) Compare the pulse rate for the fit person with the unfit person for the time shown on the graph. [3]

The unfit person's heart rate goes up whilst exercising, further than the fit person. The unfit person also starts and ends on a higher heart rate than the fit person.

- (c) (i) State the name of the **group** of exercises (including cycling and running) that the unfit person needs to do, to eventually reduce their resting pulse rate. [1]

Aerobic exercise

- (ii) Give **one** reason for your answer. [1]

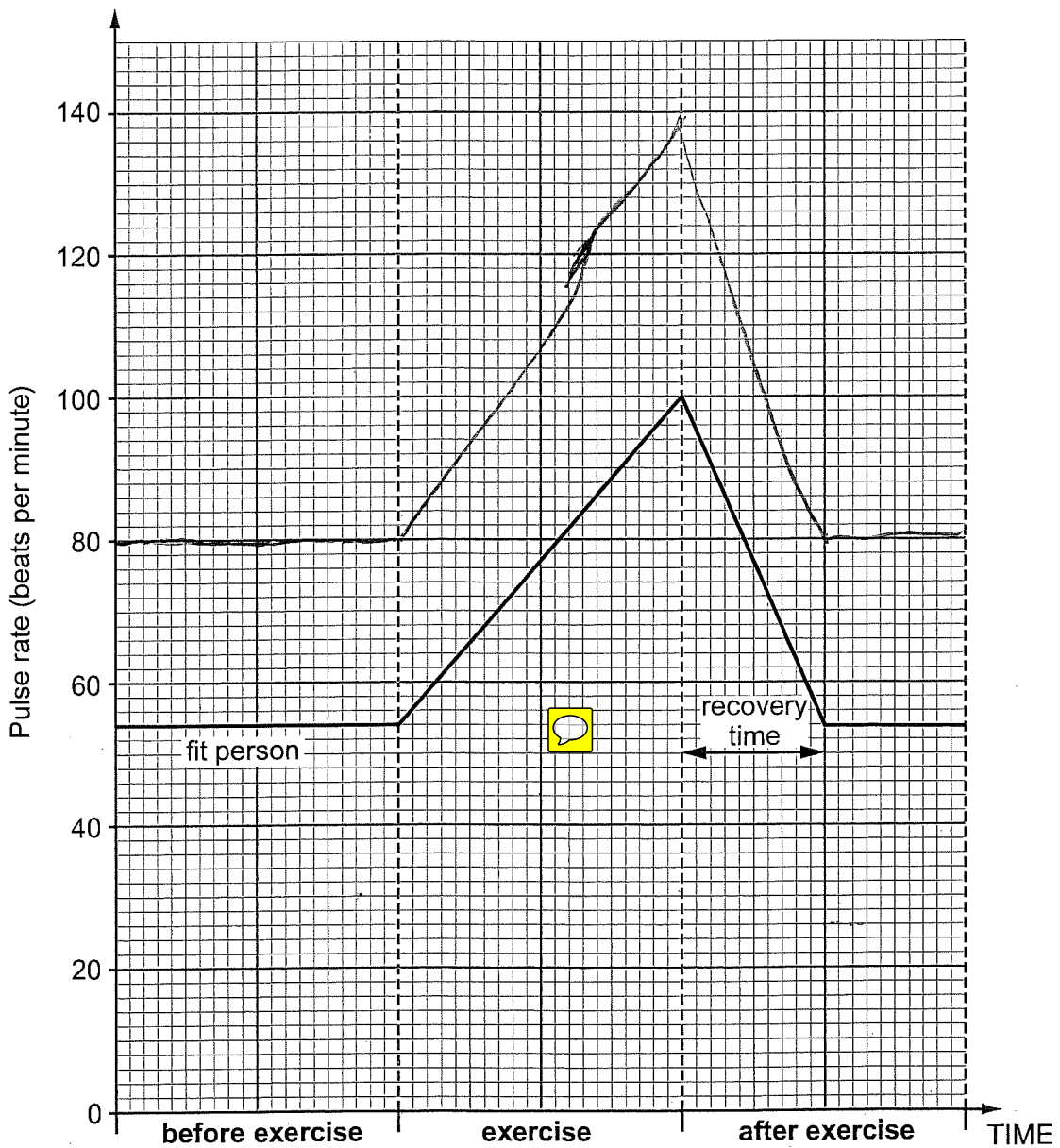
get their heart healthier and beating at a lower rate during exercise.

7. When members join a gym, their personal trainer will record basic information about them. One of these is pulse rate.

(a) Name **two** other body measurements that will be collected during the initial health check. [2]

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Plot the information for the unfit person on to the graph on the previous page. [3]

1

- (ii) Compare the pulse rate for the fit person with the unfit person for the time shown on the graph. [3]

2

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1

Aerobic exercise



- (ii) Give **one** reason for your answer. [1]

1

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5

10