

Please check the examination details below before entering your candidate information

Candidate surname					Other names					
Pearson BTEC Level 1/Level 2 Tech Award	Centre Number					Learner Registration Number				
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<b>Monday 13 May 2019 – Thursday 16 May 2019</b>										
Supervised hours: 2 hours					Paper Reference <b>21141K</b>					
<b>Engineering</b> <b>Component 3: Responding to an Engineering Brief</b> <b>Set task: Part 1 Task and Answer Booklet</b>										
<b>You must have:</b> HB or B pencil, eraser, drawing instruments and calculator								Total Marks		

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- This is **Part 1** of the set task.
- This task and answer booklet contains material for the completion of **Part 1** of the set task under supervised conditions.
- **Part 1** of the set task is out of 30 marks.
- This task and answer booklet is specific to each series and this material must be issued only to learners who have been entered to take the task in the specified series. This booklet should be kept securely until the start of the 2 hours supervised assessment period.
- This set task should be undertaken in the period timetabled by Pearson.

## Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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## Instructions for teachers

This assessment is made up of two parts. **Part 1** consists of a practical activity.

Both parts of the set task are completed during a one week period timetabled by Pearson. **Part 1** is to be completed in one session of two hours within the first four days of the timetabled period. **Part 2** is to be completed in one session on the Friday of the timetabled period.

The practical activity requires a demonstration by the teacher. This should be carried out immediately before the start of the supervised session and does not make up part of the two supervised hours. Learners are allowed to make notes up to a maximum of two sides of A4 during this demonstration, which they may use when they carry out the set task.

These notes **do not** form part of the final submission.

The learners' practical activity is undertaken in the supervised hours given. Learners will need access to the materials as listed in the *Instructions for teachers* document.

Learners must then complete the activity using this task and answer booklet. Learners should take calculators into the supervised session.

This is a formal external assessment and must be conducted with reference to the instructions in this task and answer booklet, and the *Information for Conducting External Assessments (ICEA)* document, to ensure that the supervised session is conducted correctly and that learners have the opportunity to carry out the required activities independently.

Teachers are responsible for maintaining security and for reporting issues to Pearson.

In particular:

- only permitted materials can be brought into Part 2 and the supervised environment
- materials must be kept securely and no items removed from the supervised environment
- learners must not have access to computers or the Internet.

After the session, the teacher will confirm that all learner work has been completed independently as part of the authentication submitted to Pearson.

### Outcomes for submission

**Part 1** task and answer booklet should be kept securely and submitted with the **Part 2** task and answer booklet.

Each learner must complete an authentication sheet. Practical activity notes from the demonstration will be retained securely by the centre after part 2 and may be requested by Pearson if there is suspected malpractice.

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### Instructions for learners

Before the practical activity begins you will have a demonstration by your teacher. Observe the demonstration carefully in order to complete the practical activity. You should take notes, maximum of two sides of A4, and refer to your notes to complete the practical activity, as given in the set task information.

Check that this equipment has been provided for you:

- An assembled pendulum test rig
- A timer

Read the set task information carefully.

You must plan your time and submit all the required evidence at the end of the supervised session. Your centre will advise of the timing for the supervised session.

You will complete this set task under supervision.

You must work independently throughout the supervised session and must not share your work with other learners.

You may use a calculator when carrying out the activities.

You must not have access to computers or the internet.

### Outcomes for submission

You must complete the set tasks in this task and answer booklet.

You must complete an authentication sheet.



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## Set task information

### Engineering Brief

Pendulums are used by engineers for different reasons. For example, in a clock they are used to keep accurate time and in some modern buildings they are used to help prevent damage caused by earthquakes.

Engineers need to understand how changes to the design of the pendulum alters the way it works. You have been asked to research the effect of changing the mass at the end of the pendulum.



© PhotographyByMKShutterstock.jpg

Within your organisation you have been asked to investigate how the mass of the pendulum and the distance it swings affect how long it will keep moving.

The following equipment has been provided for you:

- An assembled pendulum test rig
- A timer

You can refer to your notes from the teacher demonstration.

Appropriate health and safety procedures for this practical activity must be followed at all times.

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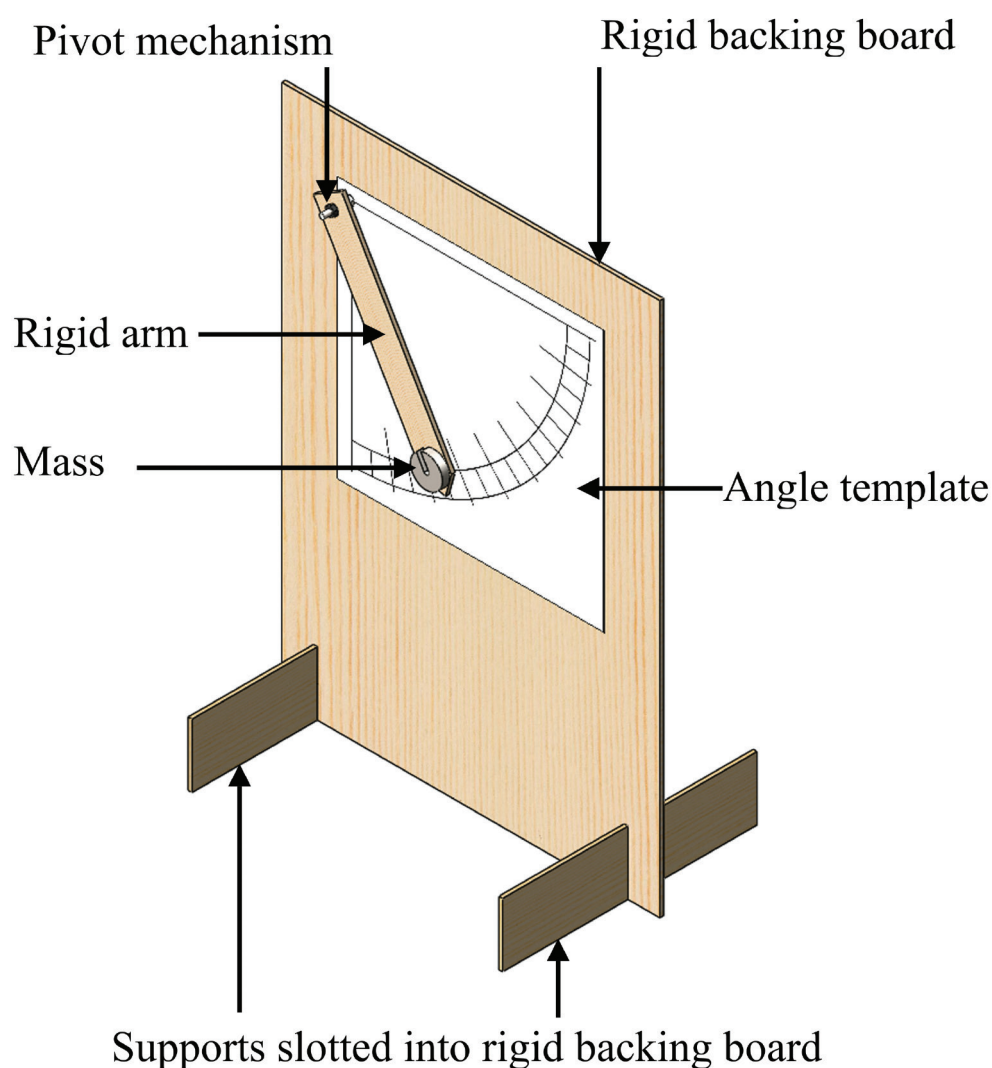
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**Follow this testing process and record your results in Activity 1a.**

1. Lift the arm so that the pointer aligns with a release point.
2. Support the arm in this position with one finger.
3. Simultaneously release the arm and start the timer.
4. Whilst the arm swings you should not affect its movement in any way.
5. When the arm stops swinging record the elapsed time.
6. Reset the timer.
7. If necessary repeat steps 1 to 6.
8. Now repeat steps 1 to 7 from a different release point.
9. Repeat steps 1 to 8 as many times as necessary.
10. Note anything you have observed during the practical activity.
11. Repeat steps 1 to 10 as above but this time with the mass removed from the arm.

**Your centre may be using equipment that looks different to the drawing below.**



**You should spend 45 minutes carrying out your practical activity and recording results in the tables for Activity 1a.**





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**(Total for Activity 1a = 6 marks)**

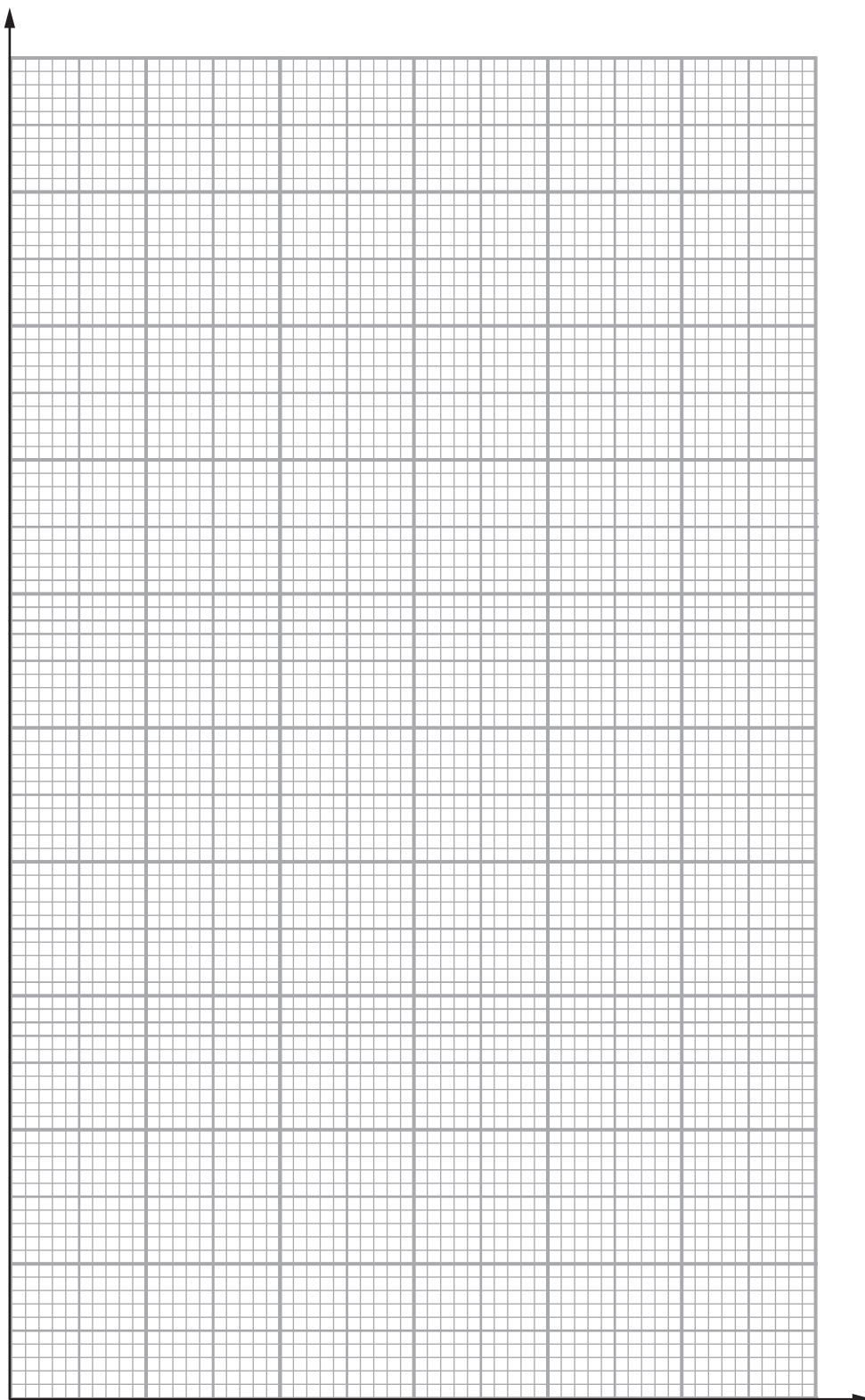


### Activity 1b: Processing results

Draw a graph of each release point angle against the corresponding elapsed time and plot a line of best fit for both the arm with the mass attached and the arm with the mass removed.

Use the headings and units from your tables in Activity 1a to label each axis.

#### Arm with mass attached



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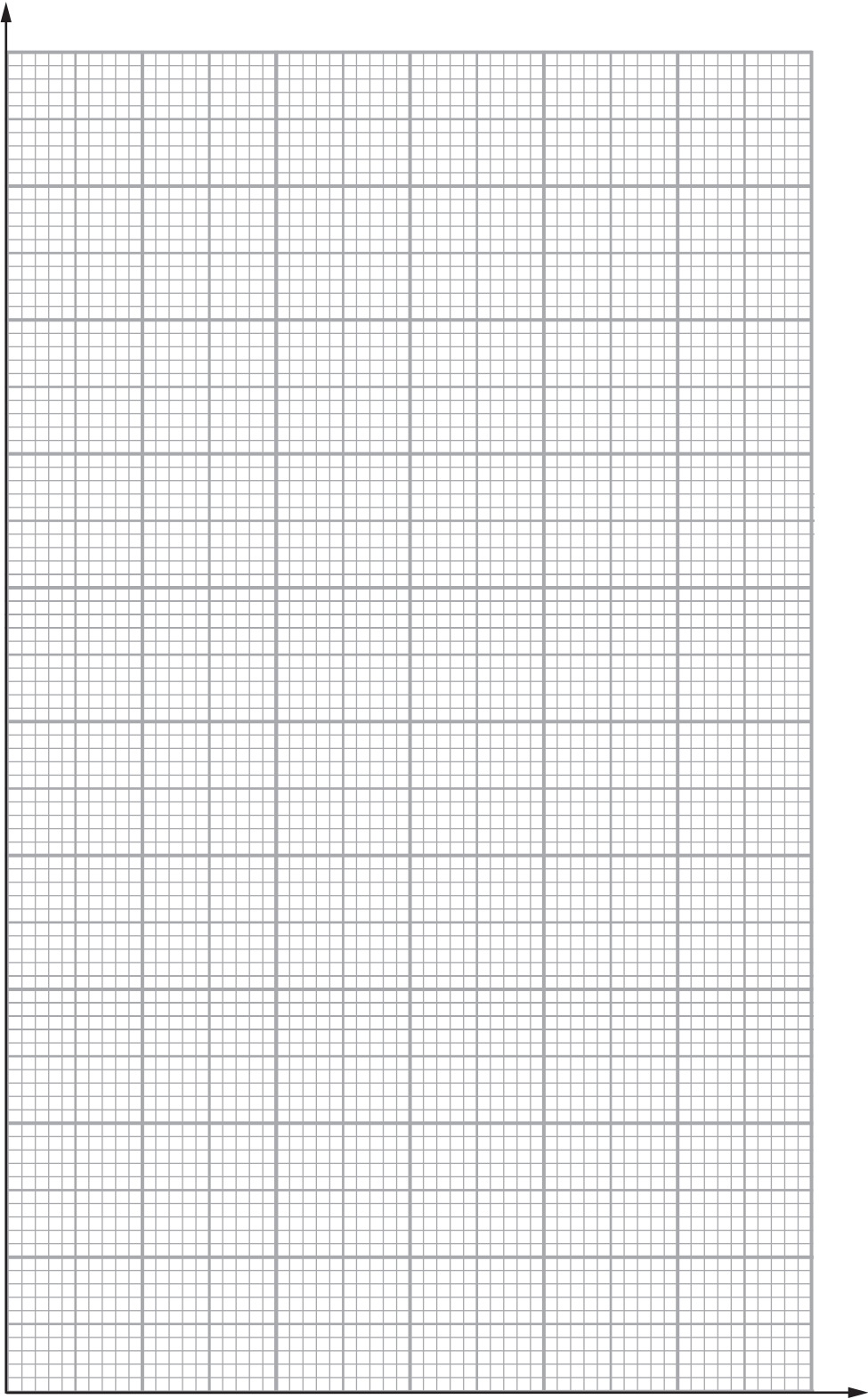
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Arm with the mass removed



You should spend 20 minutes completing Activity 1b.

(Total for Activity 1b = 8 marks)



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**Activity 1c: Drawing conclusions**

Compare the patterns in your tables and graphs.

What conclusions can be drawn from your data?

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You should spend 20 minutes completing Activity 1c.

(Total for Activity 1c = 8 marks)



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Handwriting practice area with 24 horizontal dotted lines.

You should spend 20 minutes completing Activity 1d.

(Total for Activity 1d = 8 marks)





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