

Write your name here

Surname					Other names				
Centre Number					Learner Registration Number				
Pearson BTEC Level 1/Level 2 First Certificate									

Engineering

Unit 9: Interpreting and Using Engineering Information

Friday 17 January 2014 – Afternoon Time: 1 hour	Paper Reference 21174E
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You must have: Calculator	Total Marks
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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.*

Information

- The total mark for this paper is 50.
- 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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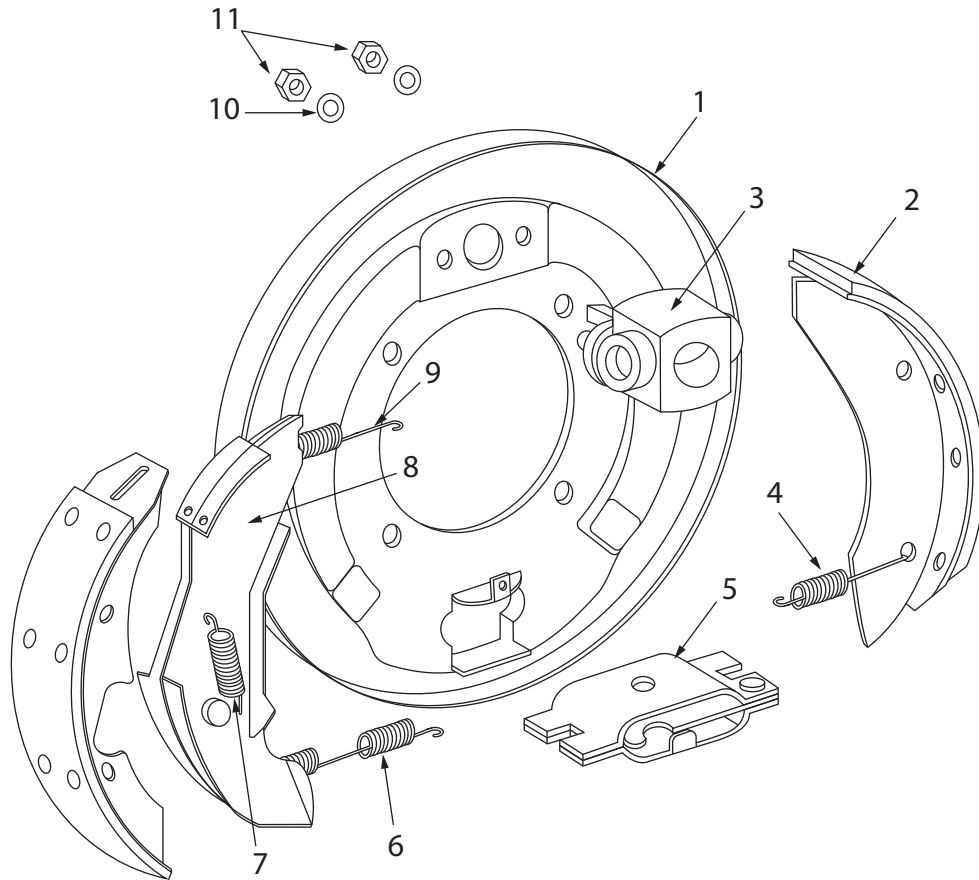


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Some questions must be answered with a cross . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

Answer ALL questions.

1 Engineers use different types of drawing to convey information effectively.



(a) What type of drawing is this?

(1)

- A 3rd angle projection
- B Exploded diagram
- C Schematic representation
- D Flow chart



(b) Identify the most appropriate application for each of these drawing types.

Draw **one** line from each drawing type to **one** application.

(2)

Drawing type

Application

Circuit diagram

Flow chart

Presenting to a client

Identifying mechanical components

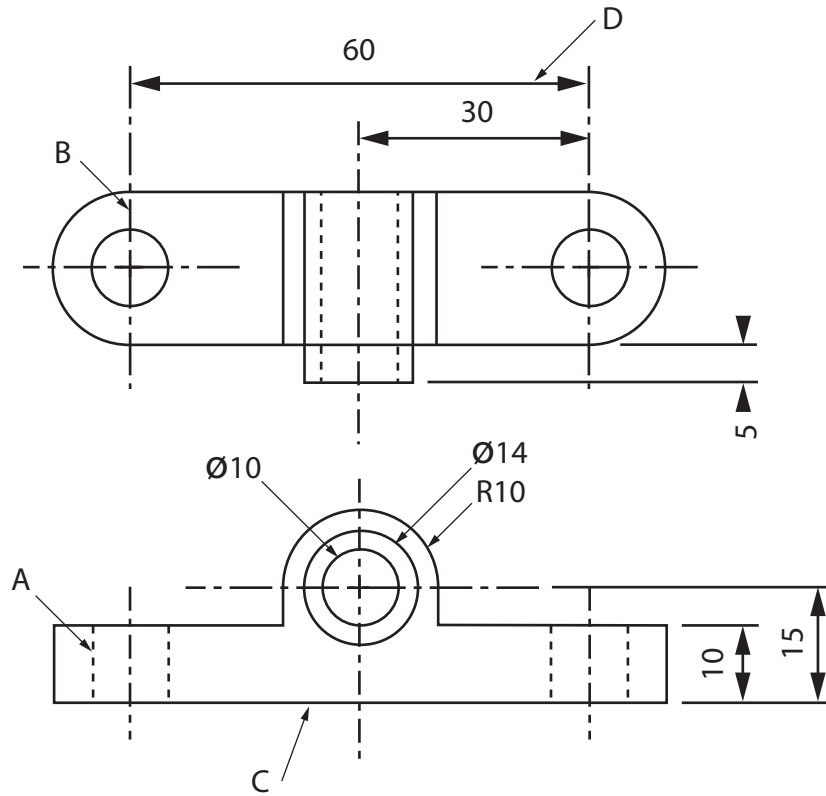
Showing the sequence of production

Producing rough design ideas

Checking the layout of electronic components



(c) This orthographic projection shows an engineered component.



(i) Which linetype is a **centre line**?

(1)

- A
- B
- C
- D

(ii) What does the \varnothing symbol mean?

(1)

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.....

(d) Give **two** disadvantages of an orthographic projection.

(2)

1

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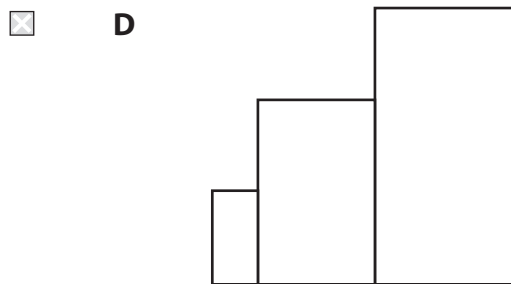
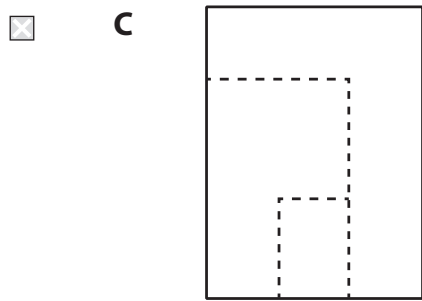
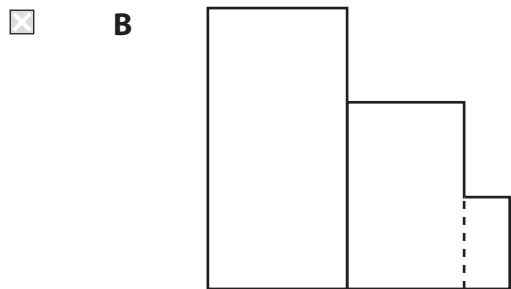
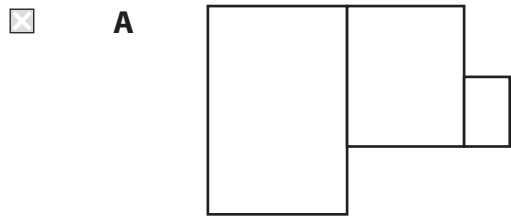
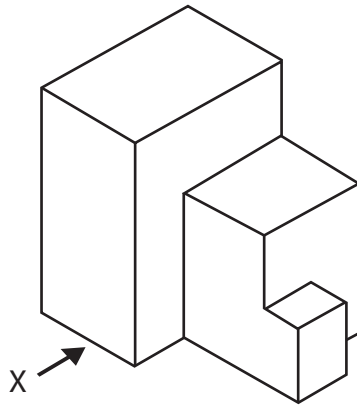
2

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(e) Identify the correct elevation labelled X on this drawing.

(1)



(Total for Question 1 = 8 marks)



2 XYZ Aeronautical is an engineering company that employs a number of material technicians.

(a) Material technicians use dangerous substances and need to be aware of what safety signs mean.

(i) What does this safety sign mean?

(1)



The background is orange.

.....

.....

(ii) This is a common symbol used on chemical packaging.



The background is orange.

State **two** safety actions that are necessary when this symbol is displayed.

(2)

1

.....

2

.....



(b) The technicians use materials specification sheets.

Which **two** of the following would be shown on a materials specification sheet for mild steel bar?

(2)

- A** Mechanical properties
- B** Sequence of production
- C** Tapping drill sizes
- D** Physical dimensions
- E** Weld symbols

(Total for Question 2 = 5 marks)



3 Spudleigh Engineering is a company that manufactures bicycles.

The company needs to organise the manufacture of a new bicycle and is considering using Gantt charts.

(a) Explain **one** reason why Gantt charts would be used to organise the manufacture of a bicycle.

(2)

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(b) Explain **two** disadvantages of using Gantt charts to organise the manufacture of a bicycle.

(4)

1

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2

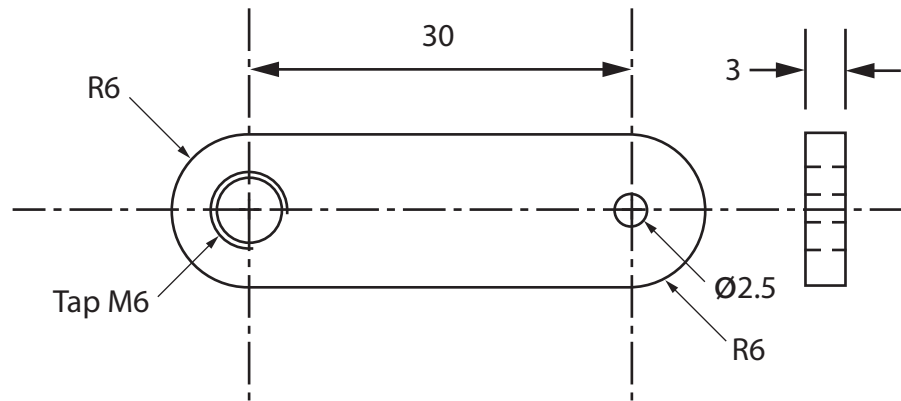
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- (c) One of the engineers at Spudleigh Engineering uses this working drawing when planning how to make a component.



What is the overall length of the component in mm?

(1)

- (d) One of the engineers needs to drill a hole for a machine screw. She uses the following tapping drill reference chart.

ISO metric coarse threads

Outside diameter	Core	Pitch	Depth	Flat	Effec	Tapping drill	Clearance drill
4.0	3.1412	0.70	0.4294	0.08750	3.545	3.30	4.10
4.5	3.5798	0.75	0.4601	0.09375	4.013	3.80	4.60
5.0	4.0184	0.80	0.4908	0.10000	4.480	4.20	5.10
6.0	4.7732	1.00	0.6134	0.12500	5.350	5.00	6.10
7.0	5.7732	1.00	0.6134	0.12500	6.350	6.00	7.20
8.0	6.4664	1.25	0.7668	0.15625	7.188	6.80	8.20

- (i) Identify the correct drill size required when producing an M6 thread.

(1)

- (ii) Give **two** reasons why it is important to use a tapping drill reference chart to find the correct drill size to tap a hole.

(2)

1

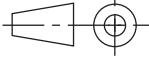
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(Total for Question 3 = 10 marks)



4 WC2 Engineering manufactures engineered components for the marine industry. Engineers at WC2 Engineering use a company-standardised layout for their working drawings. Here is an extract from a company-standardised layout.

14	Locking Sleeve	1	Aluminium
13	Support Bush	1	Aluminium
9	Support Bracket Stem	1	Low Carbon Steel
8	Angle Bracket	1	Low Carbon Steel
6	Connecting Link	1	Brass
5	Lens Case Crank	1	Aluminium
3	Support Bracket	1	Aluminium
2	Gearbox Crank	1	Aluminium
PART No.	DESCRIPTION	QTY	B

A 1:1	ALL DIMENSIONS IN mm GEN TOL = +/-0.5mm	PROJECTION 	DRAWN BY: PP DATE: 11/12/12	DRG NO. 3
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(a) What titles should be given to labels A and B in the company-standardised layout?

(2)

A

B

(b) Explain **two** advantages for WC2 Engineering of using a company-standardised layout for their working drawings.

(4)

1

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.....

2

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.....

(Total for Question 4 = 6 marks)



5 Your company manufactures a treadmill (running machine), and has recently received several complaints about its reliability from gyms in the local area. You are part of a new engineering team that has taken responsibility for improving the reliability of the treadmill.

(a) As part of your role, you have produced a Pareto chart detailing all the defects in the last month.

(i) Complete the following sentence.

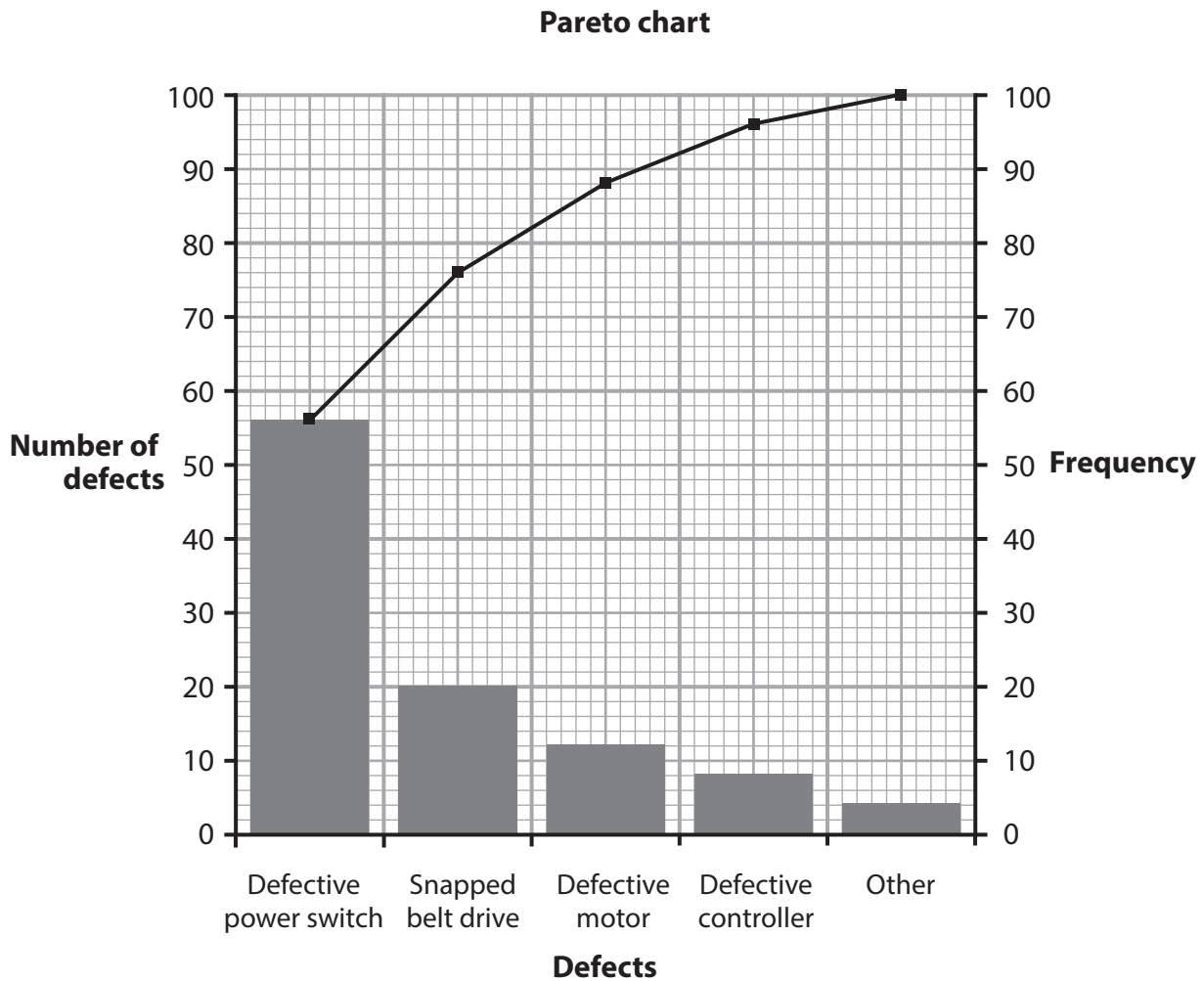
(2)

The Pareto principle states that per cent of the problems come from per cent of the causes.

(ii) Below is an image of the Pareto chart.

Using an 'X', identify the break point on the chart.

(1)



(iii) Explain **one** advantage of using a Pareto chart to analyse treadmill defects.

(2)

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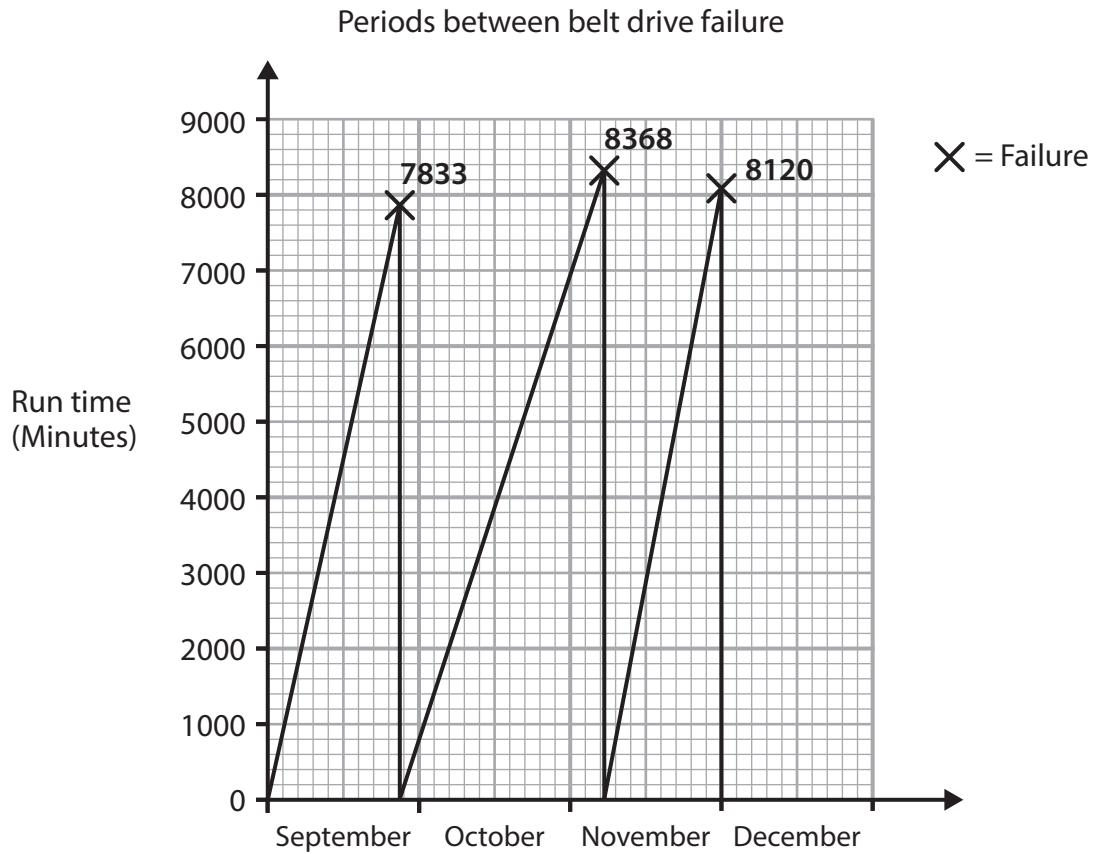
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(b) Mean Time to Failure (MTTF) applies to non-repairable items. The belt drive on the treadmill is non-repairable when it snaps (fails). The control chart below shows the belt drive failure rate over a 3-month period.



$$MTTF = \frac{\text{Total number of minutes}}{\text{Total number of failures}}$$

(i) Use the control chart to calculate the **Mean Time to Failure** in minutes for the belt drive.

Write your answer on the line below.

(2)

..... minutes



(ii) Explain **one** benefit of using MTTF information when planning maintenance activities for the treadmill.

(2)

.....

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(Total for Question 5 = 9 marks)



- 6 XYZ Electricals manufactures flat screen monitors for a range of customers, and complaints about them have risen in the last year.
- (a) To deal with this, XYZ Electricals has introduced a range of quality control documentation. One advantage of introducing quality control documentation is that it will reduce the number of customer complaints.

Explain **two** other advantages for XYZ Electricals of introducing quality control documentation during the production of flat screen monitors.

(4)

1

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2

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