

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 22 May 2015 – Morning 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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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 drawings to show information effectively.

(a) Identify **two** types of working drawing.

(2)

- A** Isometric
- B** Data sheets
- C** Machinery handbook
- D** Pareto
- E** General assembly

(b) Mechanical component symbols are used by technicians when producing engineering drawings.

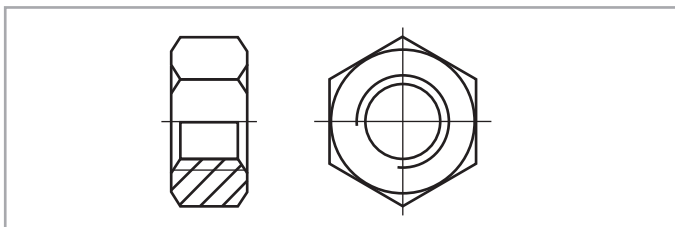
(i) Identify the correct name for each mechanical component symbol.

Draw **one** line from each mechanical component symbol to **one** name.

(2)

Mechanical component symbol

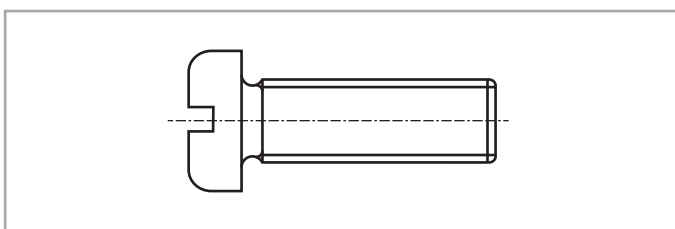
Name



Key

Clip

Nut



Spring

Screw



(ii) Give **two** reasons why mechanical component symbols are used when producing engineering drawings.

(2)

1

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2

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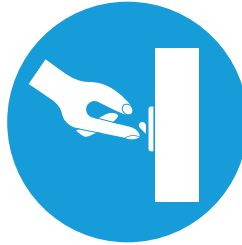
(Total for Question 1 = 6 marks)



2 Engineering technicians carry out practical tasks and need to be aware of what safety signs mean.

(a) State what this safety sign means.

(1)



The background is blue.

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



The border is red.

State **two** safety actions that need to be followed when this symbol is displayed.

(2)

1

2

(c) Name **two** signs from the safe condition category.

(2)

1

2

(Total for Question 2 = 5 marks)



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QUESTION 3 BEGINS ON THE NEXT PAGE.



3 Engineering technicians at HX6 Engineering bend sheet steel when making filing cabinets.

(a) The engineering technicians use a bend allowance chart when bending sheet steel at 90 degrees.

Bend Allowance Chart – Sheet Steel					
	Standard Metric Thickness (mm)				
Inside Bend Radius (mm)	1	1.2	1.5	2	2.5
10	15.7	15.9	16.2	16.5	17
8	13.2	13.4	13.8	14	14.5
6	10.7	10.9	11.3	11.6	12
3	5.7	5.9	6.3	6.6	7

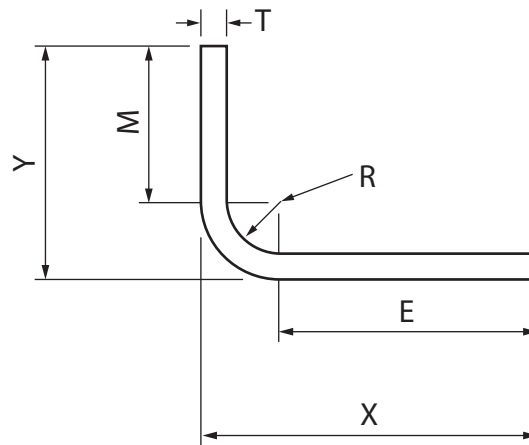
Identify the bend allowance for sheet steel with a standard metric thickness of 1.5mm and an inside bend radius of 8mm.

(1)

Bend allowance



(b) The engineering technicians use a formula to calculate the overall length of material required to form a 90 degree bend.



Length of material required to form a 90 degree bend in sheet steel =
 $E + 11.6\text{mm} + M$

Where:

$$E = X - (R + T)$$

$$M = Y - (R + T)$$

Calculate the overall length of material required to form a 90 degree bend in sheet steel when $T = 2\text{mm}$, $R = 6\text{mm}$, $X = 25\text{mm}$, $Y = 15\text{mm}$ and the bend allowance = 11.6mm .

(2)

Space for calculations.

Overall material length =



(c) The engineering technicians need to design and make a new batch of filing cabinets. They use a bend allowance chart to find out the required bend allowance and the length of material needed to form a 90 degree bend.

Explain **two** other reasons why the technicians at HX6 Engineering would use a bend allowance chart when designing and making filing cabinets.

(4)

1

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2

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(Total for Question 3 = 7 marks)

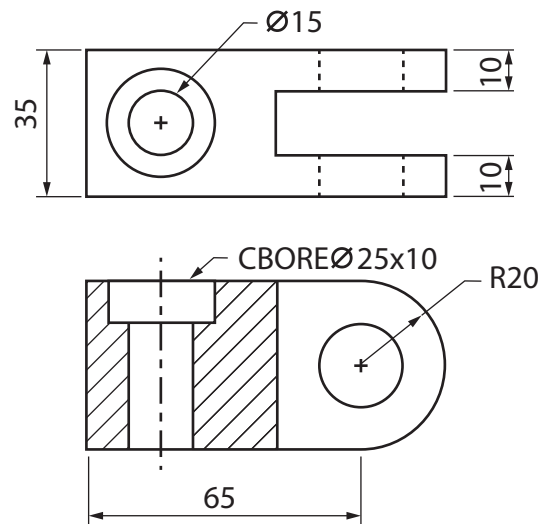


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QUESTION 4 BEGINS ON THE NEXT PAGE.



4 SW17 Systems uses orthographic projection drawings when making customised components for the communications industry.

(a) The orthographic projection drawing shows a swivel bracket component for a satellite receiver.



(i) Calculate the overall length of the swivel bracket component.

(1)

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.....

(ii) State what the abbreviation CBORE means.

(1)

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(b) Explain **two** advantages to SW17 Systems of using orthographic projection drawings when making the swivel bracket component.

(4)

1

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2

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(c) Identify **one** type of orthographic projection drawing.

(1)

- A** Welding
- B** Third angle
- C** Oblique
- D** Tapping drill

(Total for Question 4 = 7 marks)



- 5 A skilled engineer designs and makes specialist one-off angle brackets. The engineer carries out every activity when designing and making each specialist bracket.

The skilled engineer uses a production plan when making the bracket.

Part No: 3		Part name: Angle Bracket		Material: Mild Steel		Number Off: 1	
Sequence	1	Health and safety	Feeds and speeds	Tools and equipment	2	Time	
10	Mark out material to correct length	Be aware of sharp edges of the scribe when marking out	N/A	Scriber, engineers square, steel rule	Use steel rule to check marked lines	5 mins	
20	Cut material to rough length	Part could be hot, hacksaw has sharp teeth	N/A	Hacksaw, vice	Check to see marked lines are still visible	5 mins	
30	Mill to the correct length	Wear safety goggles and ensure guard is in position	500 RPM	Milling machine, 16mm end mill	Use vernier calipers to check measurements	8 mins	
40	Mark out hole positions	Heavy objects need to be handled with care	N/A	Vernier height gauge, surface plate and angle plate	Use steel rule to check marked lines	5 mins	
50	Drill holes	Wear safety goggles and ensure guard is in position	750 RPM	Drilling machine, 6.5mm drill, machine vice	Check drill size, go/no go gauge	8 mins	

(a) Name columns 1 and 2 in the production plan.

(2)

1

2



(b) The skilled engineer writes and keeps a new production plan for every specialist bracket that she designs and makes.

Explain **one** advantage to the skilled engineer of writing and keeping a new production plan when making each specialist bracket.

(2)

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(Total for Question 5 = 4 marks)



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QUESTION 7 BEGINS ON THE NEXT PAGE.



7 (a) State **two** reasons why engineers should report errors on engineering drawings.

(2)

1

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2

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(b) SN10 Engineering manufactures engineering components for a range of customers. It uses a paper-based system to organise engineering drawings. One disadvantage of this system is that, over several years, many of the paper-based engineering drawings that SN10 Engineering uses have become damaged.

Explain **two** other disadvantages to SN10 Engineering of continuing to use a paper-based system to organise engineering drawings.

(4)

1

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2

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