



## Western Australian Certificate of Education Examination, 2014

### Question/Answer Booklet

# MATERIALS DESIGN AND TECHNOLOGY

## Stage 3

## Section Three

Please place your student identification label in this box

Student Number:    In figures

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In words

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### Time recommended for this section

Suggested working time for this section:    ninety minutes

### Materials required for this section

*To be provided by the supervisor*

This Question/Answer Booklet

Sections One and Two Question/Answer Booklet

*To be provided by the candidate*

Standard items:    pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items:    non-programmable calculators approved for use in the WACE examinations

Place a tick (✓) in one of the following boxes to indicate your specialised context

Wood                   

Metal                   

Textiles                   

Number of additional answer booklets used (if applicable):

### Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

## Structure of the examination

The WACE Materials Design and Technology Stage 3 examination consists of a written component worth 50 per cent of the total examination score and a practical (portfolio) component worth 50 per cent of the total examination score.

## Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of total exam
Section One: Short answer	3	3	20	22	7.5
Section Two: Extended answer	4	4	40	42	12.5
Section Three: Candidates to choose <b>one</b> of the following contexts:					
Wood	5	5	90	54	30
Metal	5	5	90	54	
Textiles	5	5	90	54	
				<b>Total</b>	50

## Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2014*. Sitting this examination implies that you agree to abide by these rules.
2. Answer the questions according to the following instructions.  
  
Section Three: Answer **all** of the questions within your specialised field: Wood, Metal or Textiles. Write your answers in this Question/Answer Booklet.
3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
  - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

**Section Three: Sectionalised and extended answer****30% (54 Marks)**

You are required to choose **one (1)** of the following options, according to the context you have studied in 2014.

Tick one of the boxes below to indicate your choice of context.

<b>Context</b>	<b>✓</b>	<b>Question</b>	<b>Pages</b>
<b>Wood</b>	<input type="checkbox"/>	8–12	4–11
<b>Metal</b>	<input type="checkbox"/>	13–17	12–18
<b>Textiles</b>	<input type="checkbox"/>	18–22	19–24

Now turn to the relevant pages and answer the questions for the context you have selected.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

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**Section Three: Wood context**

**30% (54 Marks)**

This section contains **five (5)** questions. Answer **all** questions.

Suggested working time: 90 minutes.

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**Question 8**

**(14 marks)**

(a) Select **three** adhesives from the list below and describe **two** properties of each.

(6 marks)

- PVA
- epoxy
- cyanoacrylate
- latex/rubber based
- formaldehyde based

Adhesive: \_\_\_\_\_

Properties: \_\_\_\_\_

\_\_\_\_\_

Adhesive: \_\_\_\_\_

Properties: \_\_\_\_\_

\_\_\_\_\_

Adhesive: \_\_\_\_\_

Properties: \_\_\_\_\_

\_\_\_\_\_

(b) Identify **one** advantage and **one** disadvantage of a mix resin with hardener adhesive compared with a pre-mixed liquid adhesive.

(2 marks)

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

(c) Describe the following timber finishes and give **one** example of a suitable use for **each** finish. (6 marks)

- wax
- oil
- polyurethane

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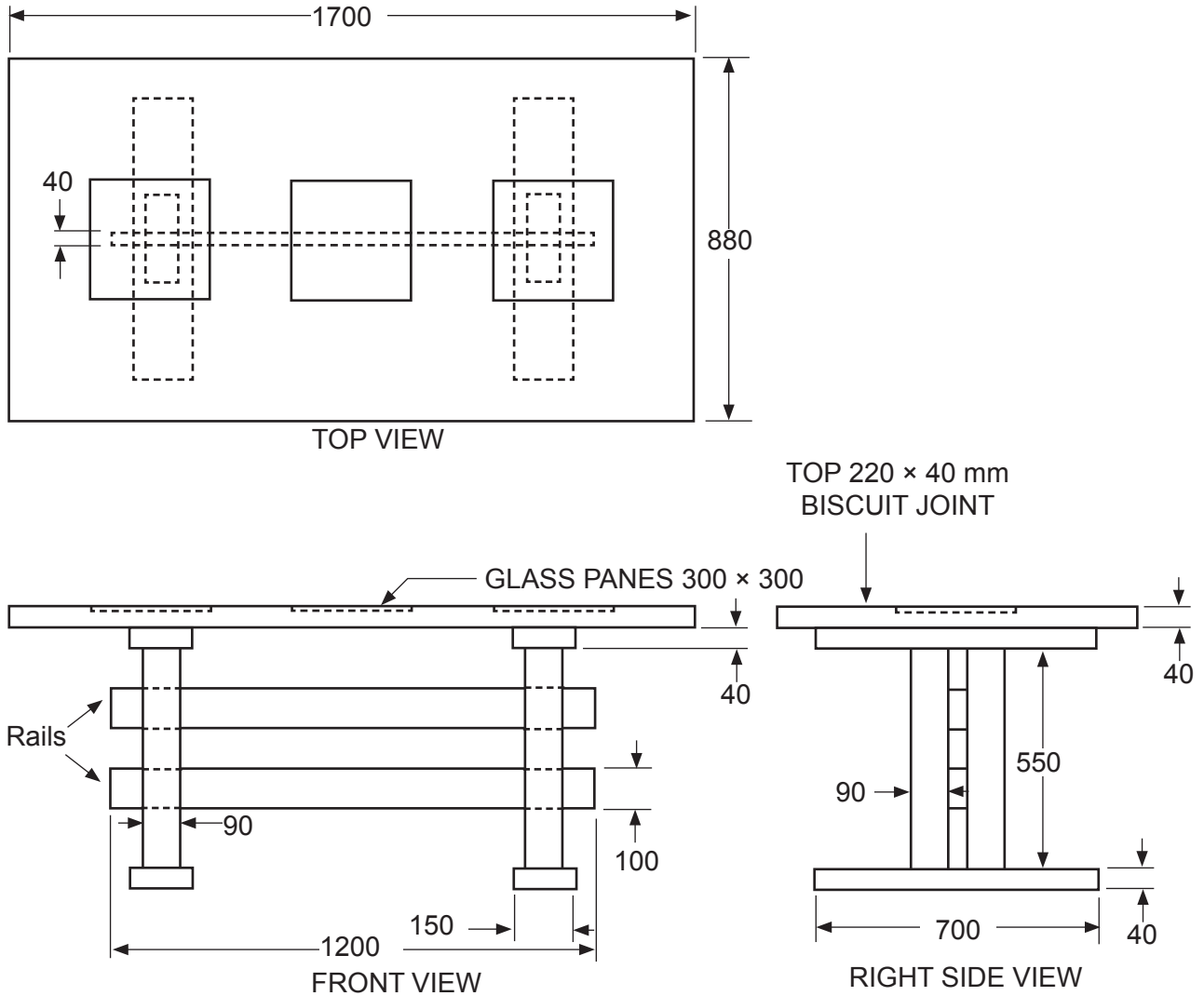
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Question 9

(10 marks)

- (a) Use the chart to calculate the cost of the timber required to make the table shown below. Complete the costing sheet on page 7 and write the total cost of each of the six parts in the spaces provided. Round the total costs of parts to the nearest cent. All sizes are in millimetres. (6 marks)



MATERIAL (mm)	COST \$
jarrah 80 x 19	6.86/Lm
jarrah 105 x 40	17.01/Lm
jarrah 175 x 40	30.17/Lm
jarrah 220 x 40	47.05/Lm
jarrah 280 x 40	63.53/Lm
jarrah 90 x 90	53.89/Lm
glass	\$420/m <sup>2</sup>

Name of timber part	Material dimension	Number required	Length required	Total length	Cost/ metre	Total cost of parts
Table top						
Post						
Base support						
Top support						
Rail						
Glass						
					<b>TOTAL COST</b>	

- (b) If you were to make this table for a client, outline **four** considerations, other than the timber and other components needed to make it, that you would need to consider when costing this product for the client. (4 marks)

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**Question 10**

**(8 marks)**

Many Australian-based manufacturers of products such as clothing, car parts and furniture are relocating some or all of their business overseas. This is due to a number of factors, including lower labour costs and an increasingly efficient and well-educated workforce. Working conditions and the implementation of occupational health and safety standards remain real challenges for some overseas countries. With this in mind, develop a **two** point risk management plan for each hazard identified in the table below, using Australian occupational health and safety guidelines to improve working conditions in these countries.

Hazard	Risk management plan
Inexperienced workers	<hr/> <hr/> <hr/> <hr/> <hr/>
Dangerous substances	<hr/> <hr/> <hr/> <hr/> <hr/>
Fire hazards	<hr/> <hr/> <hr/> <hr/> <hr/>
Industrial machinery	<hr/> <hr/> <hr/> <hr/> <hr/>







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Section Three: Metal context

30% (54 Marks)

This section contains **five (5)** questions. Answer **all** questions.

Suggested working time: 90 minutes.

Question 13

(14 marks)

The stress-strain curves for **three** iron and carbon alloys, 'A', 'B' and 'C', are shown in the stress-strain graph Figure 3.

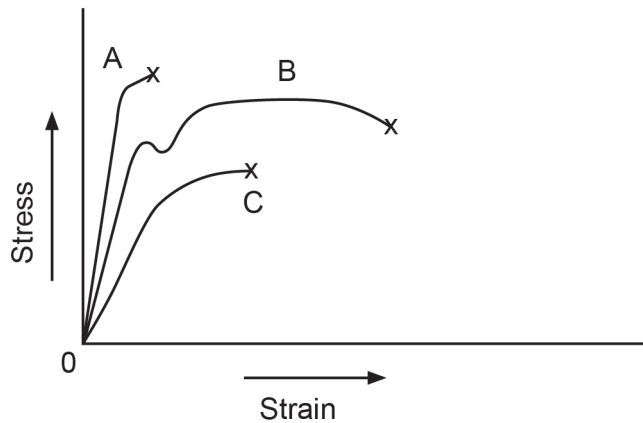


Figure 3

(a) With reference to the above stress-strain graph, state which alloy ('A', 'B' or 'C') is most suitable for each of the following applications and explain why. (6 marks)

- automobile body panel
- engineer's vice
- high tensile bolt

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(b) Identify **one** advantage and **one** disadvantage of a non-ferrous alloy compared with a ferrous alloy. (2 marks)

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(c) Describe the following metal coating processes and give **one** example of a product for which it would be suitable. (6 marks)

- anodising
- electroplating
- powder coating

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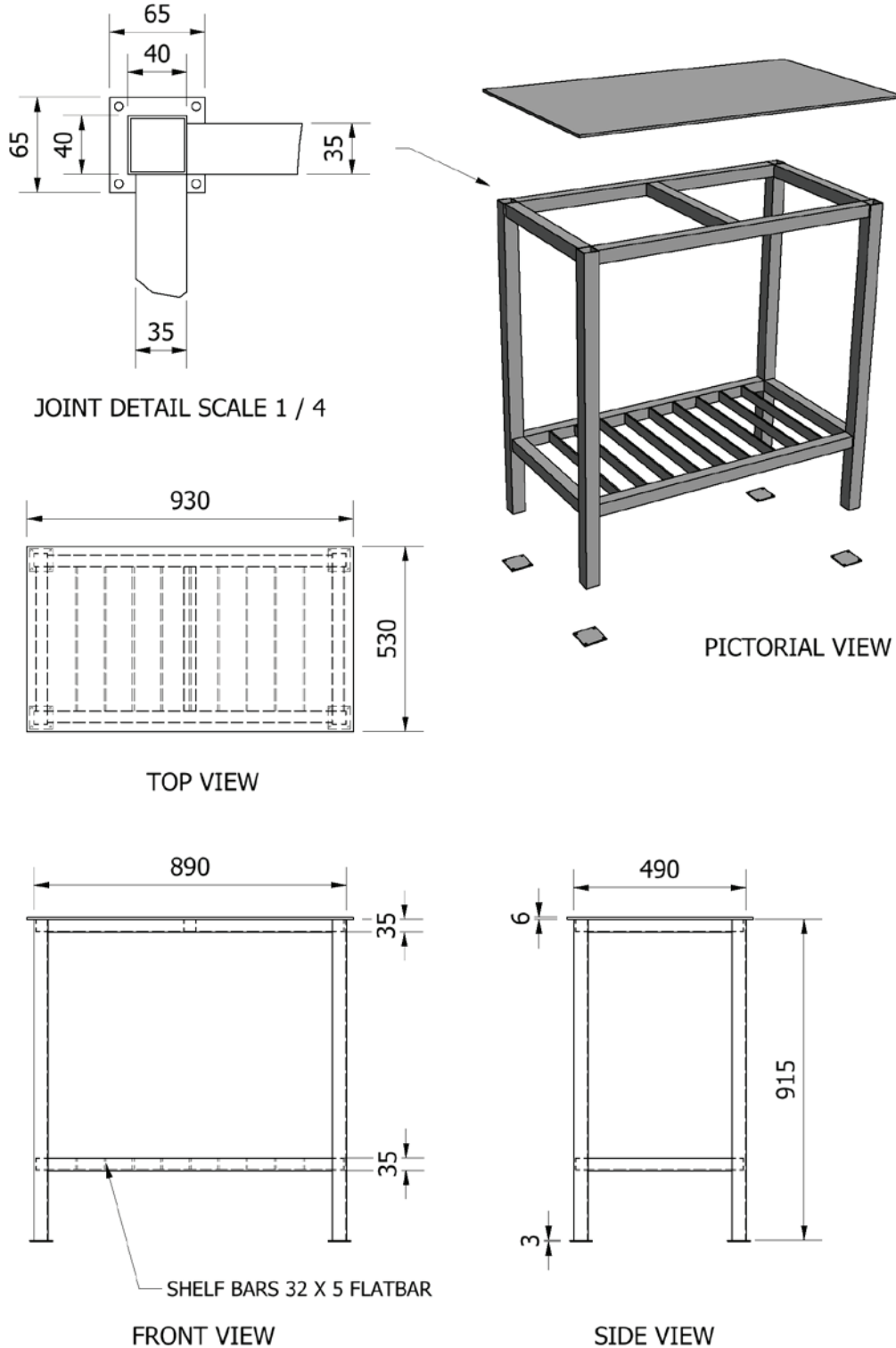
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Question 14

(10 marks)

- (a) Calculate the cost of the metal required to make the welding table shown below. Complete the costing sheet on page 15 and write the total cost of each of the six parts in the spaces provided. Round the total costs of parts to the nearest cent. All sizes are in millimetres. Note: some parts of the pictorial view have been enlarged for clarity.

(6 marks)



See next page

Material (mm)	Cost \$
35 x 35 x 1.6 square hollow section (SHS)	\$15.00/Lm
40 x 40 x 1.6 square hollow section (SHS)	\$15.50/Lm
32 x 5 mild steel flatbar	\$4.00/Lm
65 x 3 mild steel flatbar	\$8.00/Lm
6mm mild steel plate	\$160/m <sup>2</sup>

Name of metal part	Material dimension	Number required	Total length required (m)	Cost/metre	Total cost of parts
Legs					
Rails long					
Rails short					
Shelf bars					
Work surface					
Feet					
				<b>TOTAL COST</b>	

(b) If you were to make this table for a client, outline **four** considerations, other than the metal and other components needed to make it, that you would need to consider when costing this product for the client. (4 marks)

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**Question 15**

**(8 marks)**

Many Australian-based manufacturers of products such as clothing, car parts and furniture are relocating some or all of their business overseas. This is due to a number of factors, including lower labour costs and an increasingly efficient and well-educated workforce. Working conditions and the implementation of occupational health and safety standards remain real challenges for some overseas countries. With this in mind, develop a **two** point risk management plan for each hazard identified in the table below, using Australian occupational health and safety guidelines to improve working conditions in these countries.

Hazard	Risk management plan
Inexperienced workers	<hr/> <hr/> <hr/> <hr/> <hr/>
Dangerous substances	<hr/> <hr/> <hr/> <hr/> <hr/>
Fire hazards	<hr/> <hr/> <hr/> <hr/> <hr/>
Industrial machinery	<hr/> <hr/> <hr/> <hr/> <hr/>



**Question 16****(10 marks)**

Products are increasingly made with new and emerging metals. Identify **one** new and emerging metal used in an industry of your choice. Explain the reason for this development. What advantages and disadvantages does it have compared with traditional materials?

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**Section Three: Textiles context**

**30% (54 Marks)**

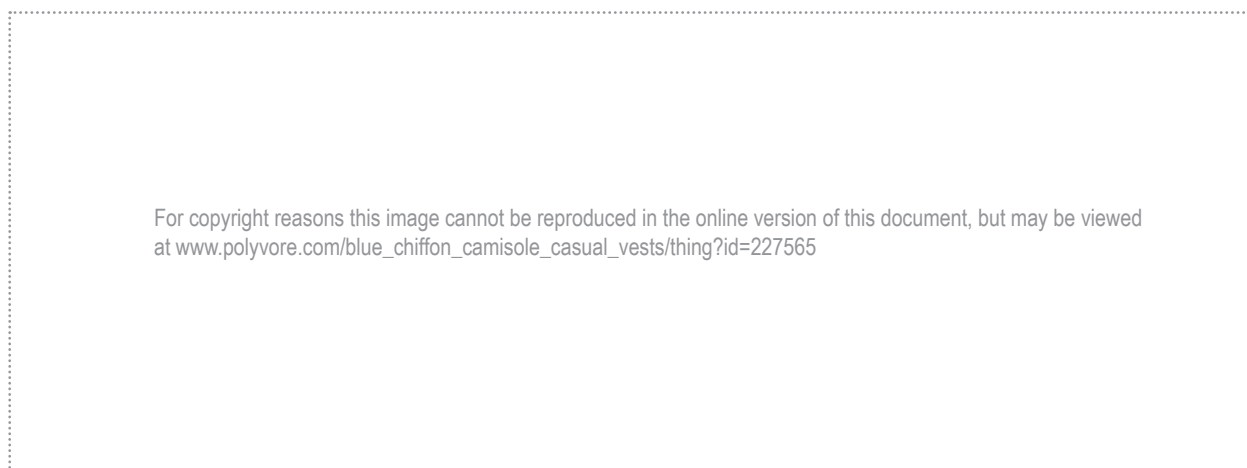
This section contains **five (5)** questions. Answer **all** questions.

Suggested working time: 90 minutes.

**Question 18**

**(14 marks)**

A client intends to wear the garment pictured below to a high tea, held outdoors in summer.



- (a) In the table below, identify **two** possible fabrics for the outer sheer layer and their characteristics. (8 marks)

Fabric name	Fibre	Yarn structure	Fabric structure

**Question 18** (continued)

- (b) With reference to at least **three** properties of each fabric that you have identified in part (a), explain which might be more appropriate for the occasion. (6 marks)

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## Question 19

(10 marks)

A designer gives you a manufacturing specification order form for the 1960s style dress shown below.

- Calculate the total amounts of materials and other items needed.
- Fill in the costing sheet below with the appropriate materials order and calculate the total cost of manufacture for this order. The first row has been completed for you.
- Calculate the cost of **one** garment.

Retro designs  
Style No: 792 Meet George Jetson  
Season: Winter

Size	10	12	14	Total
Cut Quantity	14	26	40	80

For copyright reasons this image cannot be reproduced in the online version of this document, but may be viewed at [www.refinery29.com/fawn-over-these-fresh-fall-dresses#slide-2](http://www.refinery29.com/fawn-over-these-fresh-fall-dresses#slide-2)

Materials	Size 10	Total S10	Size 12	Total S12	Size 14	Total S14	Total Units
Red wool gaberdine	1.00 m	14	1.20 m	31.2	1.40 m	56	101.2
Black wool gaberdine	1.20 m		1.40 m		1.60 m		
Thread	2 units		2 units		2 units		
Interfacing	0.80 m		0.80 m		0.95 m		
Zip	0.60 m		0.60 m		0.60 m		

Total materials	Unit/Qty	Cost	Total for batch	Total for one garment
Red wool gaberdine		\$3.50/m		
Black wool gaberdine		\$2.00/m		
Thread		\$2.25 each		
Interfacing		\$1.80/m		
Zip		\$0.80/m		
<b>Total</b>				

See next page

**Question 20**

**(8 marks)**

Many Australian-based manufacturers of products such as clothing, car parts and furniture are relocating some or all of their business overseas. This is due to a number of factors, including lower labour costs and an increasingly efficient and well-educated workforce. Working conditions and the implementation of occupational health and safety standards remain real challenges for some overseas countries. With this in mind, develop a **two** point risk management plan for each hazard identified in the table below, using Australian occupational health and safety guidelines to improve working conditions in these countries.

Hazard	Risk management plan
Inexperienced workers	<hr/> <hr/> <hr/> <hr/> <hr/>
Dangerous substances	<hr/> <hr/> <hr/> <hr/> <hr/>
Fire hazards	<hr/> <hr/> <hr/> <hr/> <hr/>
Industrial machinery	<hr/> <hr/> <hr/> <hr/> <hr/>











Spare page

Question number: \_\_\_\_\_

A series of horizontal lines for writing the answer.









## ACKNOWLEDGEMENTS

### Section One

- Question 2** Image of *Microsoft natural wireless laser mouse*. (n.d.). Retrieved from [www.slashgear.com/microsofts-ergonomic-mouse-gets-the-once-over-312266/](http://www.slashgear.com/microsofts-ergonomic-mouse-gets-the-once-over-312266/)

### Section Two

- Question 5** Couvillon, C. (2009). Planetix tumbler 1.0 [Images]. *Yanko Design*. Retrieved from [www.yankodesign.com/2009/06/08/new-play-in-the-playground/](http://www.yankodesign.com/2009/06/08/new-play-in-the-playground/)

### Section Three

- Question 18** *Blue chiffon camisole* [Image]. (n.d.). Retrieved February 3, 2014, from [www.polyvore.com/blue\\_chiffon\\_camisole\\_casual\\_vests/thing?id=227565](http://www.polyvore.com/blue_chiffon_camisole_casual_vests/thing?id=227565)

- Question 19** *Red dress* [Image]. (n.d.). Retrieved March 8, 2014, from [www.refinery29.com/fawn-over-these-fresh-fall-dresses#slide-3](http://www.refinery29.com/fawn-over-these-fresh-fall-dresses#slide-3)

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