



ATAR course examination, 2017

Question/Answer booklet

MATERIALS DESIGN AND TECHNOLOGY

Section Three

Please place your student identification label in this box

Student number: In figures

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In words

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

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 this examination

Place a tick (✓) in one of the following boxes to indicate your examination 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 material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of the examination

The Materials Design and Technology ATAR course examination consists of a written component and a practical (portfolio) component.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of written examination
Section One Short answer	3	3	20	21	15
Section Two Extended answer	4	4	40	31	25
Section Three Candidates to choose one of the following contexts: Wood Metal Textiles	5	5	90	82	60
Total					100

Instructions to candidates

- The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2017*. Sitting this examination implies that you agree to abide by these rules.
- Write your answers in this Question/Answer booklet.
- Answer the questions according to the following instructions.

Section Three: Answer all of the questions within your specialised field: Wood, Metal or Textiles.
- You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
- Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Section Three: Sectionalised and extended answer**60% (82 Marks)**

You are required to choose **one (1)** of the following options, according to the context you have studied in 2017.

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

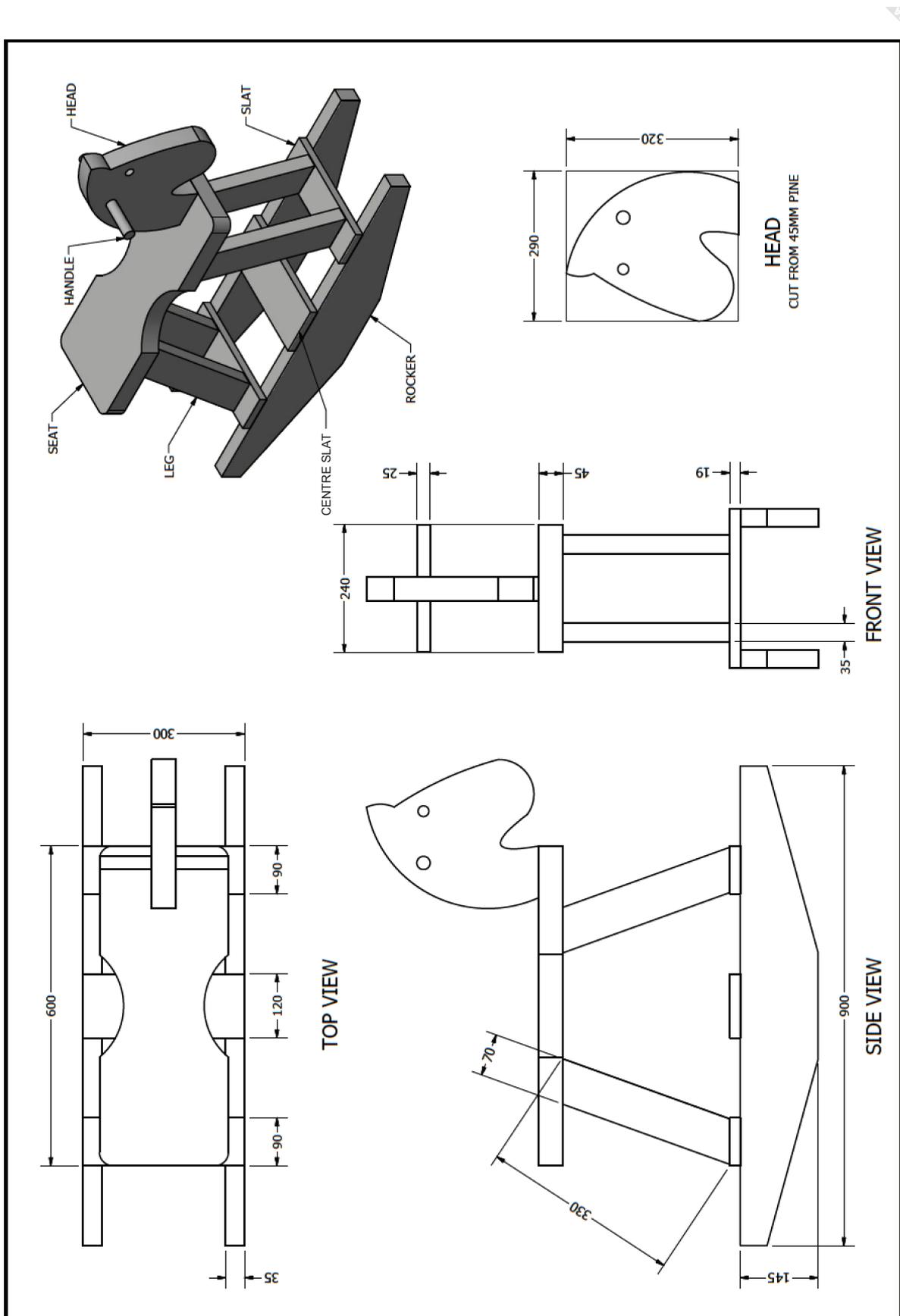
Context	✓	Question	Pages
Wood	<input type="checkbox"/>	8–12	4–15
Metal	<input type="checkbox"/>	13–17	16–27
Textiles	<input type="checkbox"/>	18–22	28–39

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

Question 10

(34 marks)

Below is an image and a set of plans for a rocking horse.



See next page

D.A.R.	
Size (mm)	Cost PLM
19 x 19	\$1.56
40 x 19	\$1.90
80 x 19	\$4.12
90 x 19	\$5.40
120 x 19	\$6.12
175 x 19	\$9.35

D.A.R.	
Size (mm)	Cost PLM
210 x 45	\$14.97
240 x 45	\$16.20
290 x 45	\$17.86
300 x 45	\$18.25

D.A.R.	
Size (mm)	Cost PLM
30 x 35	\$1.10
40 x 35	\$1.75
60 x 35	\$2.10
70 x 35	\$2.43
125 x 35	\$4.24
145 x 35	\$7.40

Dowel	
Size (mm)	Cost PLM
18	\$4.68
20	\$6.32
22	\$8.21
25	\$9.60
28	\$12.20
32	\$15.86

- (a) Using the image and the information in the tables above, complete each row of the table below and calculate the total cost of producing a single rocking horse. Round the costs to the nearest cent. (8 marks)

Part	Material	Size: (L × W × T)	Number required	Cost/m	Cost
Rocker	pine				
Slats	pine				
Centre slat	pine				
Legs	pine				
Seat	pine				
Head	pine				
Handle	dowel				
Total cost					\$

Question 10 (continued)

- (e) Using the risk assessment table below, outline **two** potential hazards for each tool used during the production process described and **two** control measures that relate to the hazards for each. (12 marks)

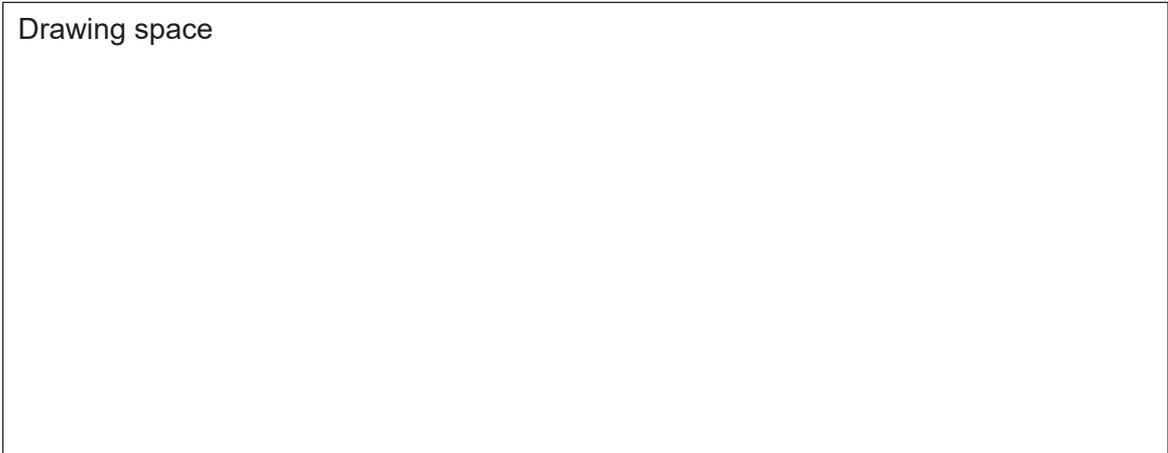
Tool	Potential hazards	Control measures
Using a drop saw to cut timber to length.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Using a router to shape the head piece.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Using a bandsaw to cut the tapers on each of the rockers, ensuring that the cut is on the waste side of the line.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Question 11

(10 marks)

- (a) Describe the cellular structure of **one** timber. Use an annotated drawing to support your answer. (4 marks)

Drawing space

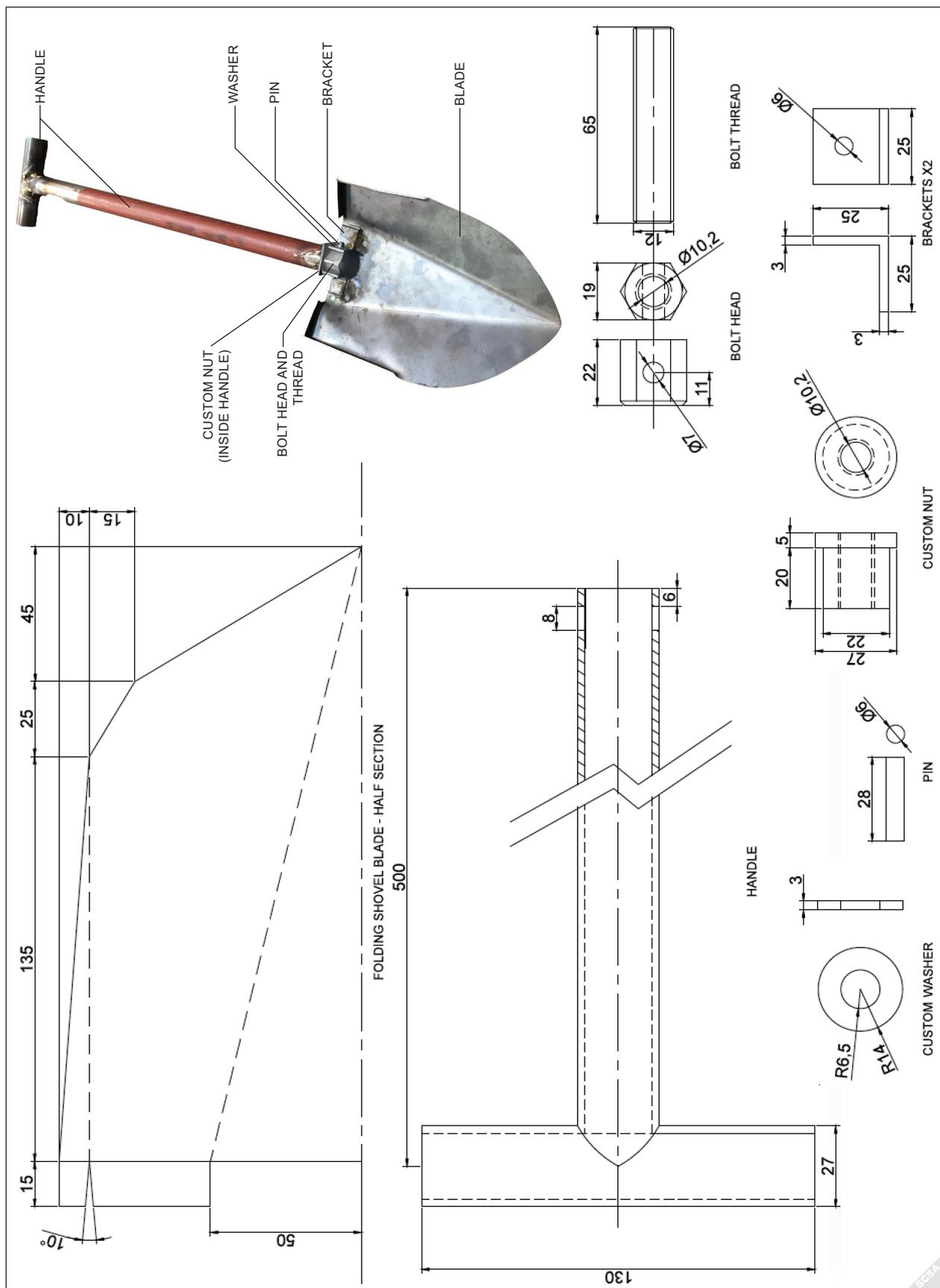


- (b) Describe how the cellular structure contributes to **three** properties of this timber. (6 marks)

Question 15

(34 marks)

Below is an image and a set of plans for a camping shovel.



See next page

Hexagonal bar	
Size (mm)	Cost PLM
16 mm	\$25.78
19 mm	\$37.14
22 mm	\$50.56

MS round bar	
Size (mm)	Cost PLM
6 mm	\$2.22
12 mm	\$3.43
20 mm	\$7.90
22 mm	\$9.55
27 mm	\$11.39

ERW tube	
Size (mm)	Cost PLM
16 mm	\$6.32
18 mm	\$7.62
20 mm	\$9.11
23 mm	\$11.50
27 mm	\$14.50

Threaded rod	
Size (mm)	Cost PLM
M10	\$7.10
M12	\$9.92
M16	\$15.90

MS angle	
Size (mm)	Cost PLM
25 x 25 x 3	\$3.06
25 x 25 x 5	\$4.52
25 x 25 x 6	\$5.69
30 x 30 x 3	\$3.69
30 x 30 x 5	\$5.50

MS flat bar	
Size (mm)	Cost PLM
25 x 3	\$2.53
25 x 5	\$3.03
28 x 3	\$6.07
28 x 5	\$7.10
32 x 3	\$6.44

- (a) Using the image and the information in the tables above, complete each row of the table below and calculate the total cost of producing a single camping shovel. Round the costs to the nearest cent. (8 marks)

Part	Material	Size: (L × W × T)	Number required	Cost/m	Cost
Blade	MS plate	220 x 200 x 3	1	N/A	\$7.50
Handle	ERW tube				
Bolt head	hexagonal bar				
Bolt thread	threaded bar				
Brackets	angle bar				
Custom nut	round bar				
Custom washer	flat bar				
Pin	round bar				
Total cost					\$

See next page

Question 15 (continued)

- (e) Using the risk assessment table below, outline **two** potential hazards for each tool used during the production process described and **two** control measures that relate to the hazards for each. (12 marks)

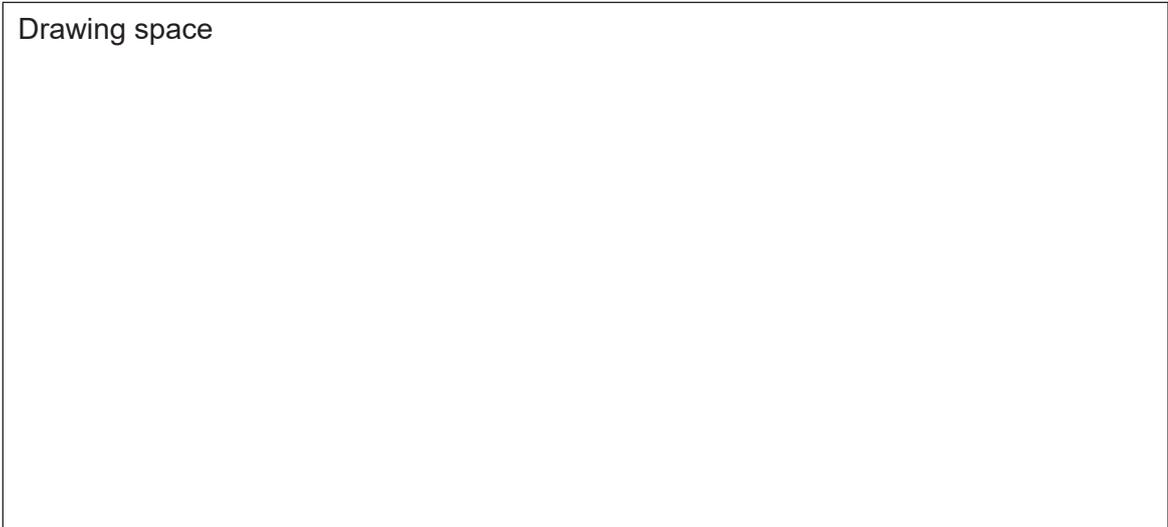
Tool	Potential hazards	Control measures
Using bench shears remove the excess material from the shovel blade.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Using the MIG welder to attach the angle brackets to the blade.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Using the drill press to drill the 6 mm hole in the centre of the bracket.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Question 16

(10 marks)

- (a) Describe the atomic (crystalline/grain) structure of steel. Use an annotated drawing to support your answer. (4 marks)

Drawing space

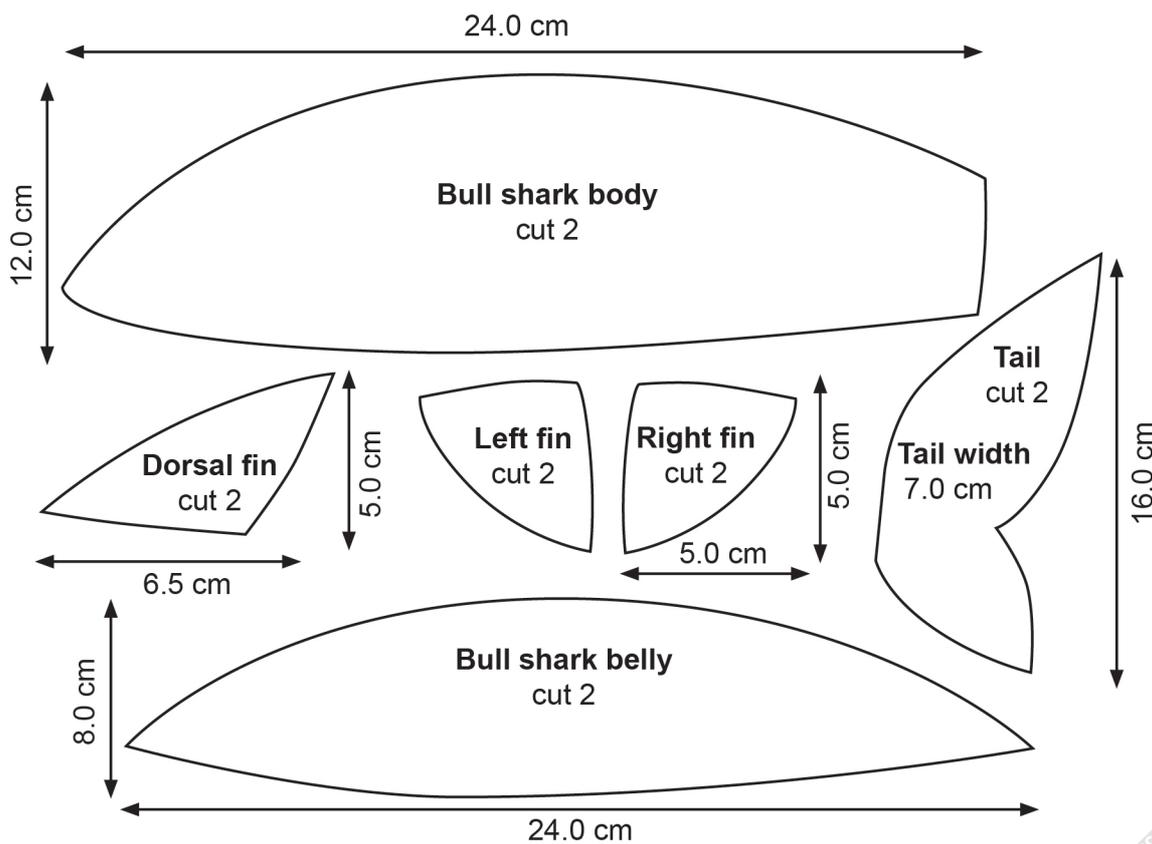


- (b) Describe how the atomic (crystalline/grain) structure of steel contributes to **three** physical properties. (6 marks)

Question 20

(34 marks)

Below is a photograph and a pattern for a bull shark pencil case.



See next page

- (a) Using the photograph, pattern and information in the tables below, complete each row of the table and calculate the total cost of producing a single shark pencil case. Select a zipper type and enter the type in the shaded area. Round the costs to the nearest cent. (8 marks)

Fabric	Cost
Orange felt 112 cm wide	\$5.60/m
Blue poly-cotton 112 cm wide	\$2.99/m
Wadding 150 cm wide	\$6.00/m

Zipper	Cost
Invisible zip 12 cm	\$3.99
Standard zip 12 cm	\$1.99

Item	Quantity	Cost/m	Cost
Body fabric			
Fin and tail fabric			
Polyester iron on wadding liner (for body, tail, mouth and fins)			
Thread	1	\$2.99	\$2.99
Zipper type:	1		
Eyes (2 pk)	1	\$1.99	\$1.99
Total cost			\$

- (b) To add a zipper to any product, the sewing machine must first be prepared. Explain in detail, using the correct terminology, the steps in the process followed to prepare the machine and the placement of the fabric and zipper in the machine before you begin. (4 marks)

- (e) Using the risk assessment table below, outline **two** potential hazards for each tool used during the production process described and **two** control measures that relate to the hazards for each. (12 marks)

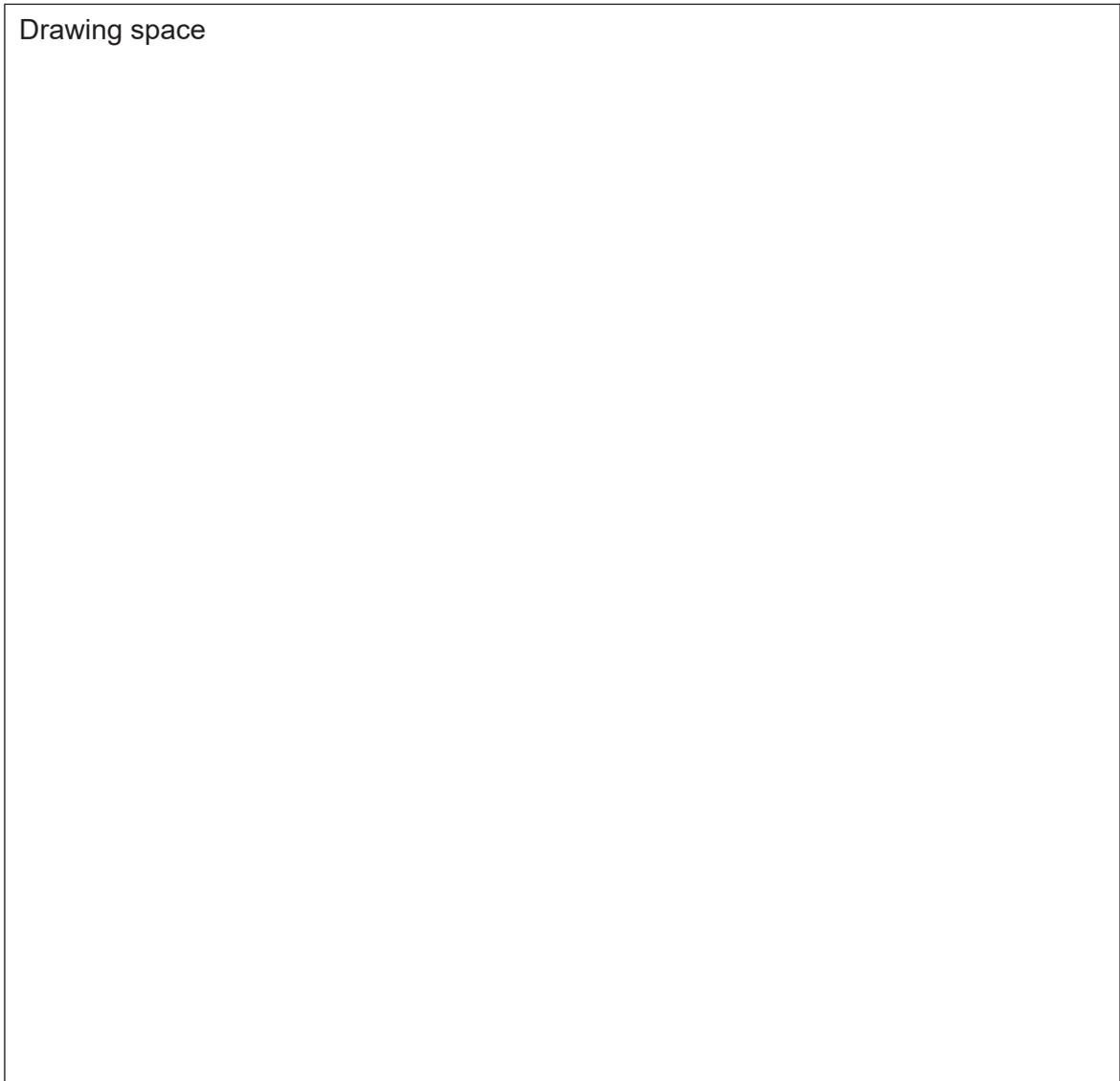
Tool	Potential hazards	Control measures
Using the sewing machine to attach the zipper.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Using the overlocker.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Ironing on the wadding.	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Question 21

(10 marks)

- (a) Describe the molecular and morphological structure of **one** fibre. Use an annotated drawing to support your answer. (4 marks)

Drawing space



ACKNOWLEDGEMENTS

- Question 3** Image: Fitbit, Inc. (n.d.). *Fitbit charge*. Retrieved July, 2017, from www.amazon.co.uk/Fitbit-Wireless-Activity-Tracker-Wristband/dp/B00PU6QMGA
- Question 4** Image one: Probus. (n.d.). *Stab can opener*. Retrieved July, 2017, from www.amazon.co.uk/stab-opener-FASHIONED-PUSH-OPENERS/dp/B004AFELB0/ref=pd_bxgy_201_img_2?_encoding=UTF8&psc=1&refRID=AS6GPQDTNGG2P9MBCJ8M
Image two: Zyliss. (n.d.). *Zyliss lock n' lift can opener with lid lifter magnet, green* [Image]. Retrieved July, 2017, from www.wisdomberry.com/book.php?asin=B00421ATQS
- Question 5** [Trunki luggage advertisement images]. (n.d.). Retrieved July, 2017, from www.babybg.com/popup_image.php/pID/1514
- Questions 12, 17 & 22** Definition from: Globalization. (2017). In *BusinessDictionary*. Retrieved July, 2017, from www.businessdictionary.com/definition/globalization.html
- Question 15** Image of camping shovel by courtesy of the examining panel.

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