1.6 Textile fibres and fabrics: 30-minute Pack

AQA 8552 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 A reusable tool roll needs a fabric that supports at least 30 N in the stated strip test, survives at least 15,000 abrasion cycles and costs no more than GBP 5.00 per square metre. All samples have the same area and are tested using the same methods.

Sample	Structure	Maximum strip load (N)	Abrasion cycles to hole	Cost (GBP per square metre)
P	Plain woven	42	12,000	4.10
T	Twill woven	48	20,000	4.80
K	Knitted	25	16,000	4.00
N	Bonded non-woven	32	18,000	5.40

(a) Recommend the only sample that meets all three requirements. Support the recommendation using each requirement. **(4)**

(b) Explain why a sewn prototype should also be load-tested before the tool roll design is accepted. **(2)**

(Total for Question 1 is 6 marks)

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2 Three fabric structures are described below. No image is needed.

X: two sets of yarns cross over and under each other.

Y: yarn forms a series of interlocking loops.

Z: a web of fibres is bonded with adhesive without first making yarns.

(a) Identify the structure of X, Y and Z using woven, knitted and non-woven once each. **(3)**

(b) Name the lengthwise and crosswise sets of yarns in a woven fabric. **(2)**

(Total for Question 2 is 5 marks)

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3 A maker tests two equal-sized fabric samples for a reusable hand-drying cloth. The cloth should absorb plenty of water and dry quickly between uses. All tests use the same conditions.

Sample	Water absorbed (g)	Drying time (minutes)
C: cotton	18	100
P: polyester	2	30

(a) Choose the better sample if water absorption is the main priority. Justify your choice with a comparison of the results. **(2)**

(b) Explain one disadvantage of C for repeated use during a busy day. Use the drying results. **(2)**

(Total for Question 3 is 4 marks)

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4 A designer compares fabrics for a close-fitting pull-on wrist warmer. Each sample starts at 10.0 cm long and is stretched under the same load.

Sample	Structure	Length under load (cm)	Length after unloading (cm)
W	Woven	10.4	10.0
K	Knitted	13.6	10.1

(a) Calculate the percentage extension of K under load. Use percentage extension = (increase in length / original length) x 100. **(2)**

(b) Explain why K is more suitable than W for pulling over the hand. Refer to the structure and the extension data. **(2)**

(Total for Question 4 is 4 marks)

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5 A nursery needs circular liners for seedling pots. A liner is used once, must cost no more than 5 p and must support at least 2 N while wet. The nursery tests two materials.

Material	Construction	Cost per liner (p)	Maximum wet load (N)
N	Adhesive-bonded fibre web	3	3
V	Woven yarns	8	10

(a) Describe how the fibres are held together in N and explain why this is a non-woven structure. **(2)**

(b) Choose the material that meets both requirements. Support your choice using both limits. **(2)**

(Total for Question 5 is 4 marks)

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6 A maker compares two versions of the same fabric for a soft indoor neck wrap. Brushing raises fibres from the surface to form a nap. A snag test counts loops or fibres caught by a standard hook; fewer is better.

Finish	Warmth rating (1 low, 5 high)	Softness rating (1 low, 5 high)	Snags per test
Unbrushed	2	2	1
Brushed	4	5	6

(a) Explain how brushing can increase warmth. **(2)**

(b) Give one benefit and one drawback of choosing the brushed version for this neck wrap. Use the results. **(2)**

(Total for Question 6 is 4 marks)

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Mark scheme · 1.6 Textile fibres and fabrics: 30-minute Pack

Question 1

(a) Recommends T. **B1**

(a) Compares 48 N with the minimum 30 N. **B1**

(a) Compares 20,000 cycles with the minimum 15,000 cycles. **B1**

(a) Compares GBP 4.80 with the maximum GBP 5.00 per square metre. Credit each correct comparison independently of the recommendation. **B1**

(a) Answer: T supports 48 N, survives 20,000 abrasion cycles and costs GBP 4.80 per square metre, meeting all three limits.

(b) Identifies that seams, stitching, fastenings or the assembled product were not tested by the fabric strip test. **B1**

(b) Explains that these may be weaker/fail under the tools' load, so fabric strength alone does not establish the product's load capacity. Accept realistic loading or repeated use exposing an assembly failure. **B1**

(b) Answer: The strip test only tests the fabric. Seams or fastenings in the complete roll may fail when loaded with tools.

Question 2

(a) X is woven. **B1**

(a) Y is knitted. **B1**

(a) Z is non-woven; accept bonded non-woven. **B1**

(a) Answer: X: woven. Y: knitted. Z: non-woven.

(b) Lengthwise yarns are the warp. **B1**

(b) Crosswise yarns are the weft. **B1**

(b) Answer: Lengthwise: warp. Crosswise: weft.

Question 3

(a) Chooses C (cotton). **B1**

(a) Supports the choice with 18 g versus 2 g, or 16 g more water absorbed. The numerical comparison may earn this mark independently. **B1**

(a) Answer: C: it absorbed 18 g compared with 2 g for P.

(b) Uses the longer drying time of C: 100 minutes versus 30 minutes, or 70 minutes longer. **B1**

(b) Links the delay to a damp cloth being unavailable for dry reuse, needing spare cloths or slower turnaround. **B1**

(b) Answer: C takes 100 minutes to dry compared with 30 minutes for P, so it is more likely to remain wet when needed again.

Question 4

(a) Uses (13.6 - 10.0) / 10.0 x 100, or equivalent. **M1**

(a) 36%. Accept a correct answer without working. **A1**

(a) Answer: (13.6 - 10.0) / 10.0 x 100 = 36%.

(b) Knitted loops can change shape/open out under tension; accept loops allow greater extension. **B1**

(b) Links K reaching 13.6 cm rather than 10.4 cm (or 3.6 cm versus 0.4 cm extension) to passing over the hand more easily. **B1**

(b) Answer: The interlocking knitted loops can change shape, allowing K to extend by 3.6 cm rather than 0.4 cm, so it can pass over the hand more easily.

Question 5

(a) Adhesive bonds hold the fibres together. **B1**

(a) Fibres form a web directly, rather than interlaced or looped yarns; accept no weaving or knitting stage. **B1**

(a) Answer: Adhesive bonds hold the fibres together in a web. There are no interlaced or looped yarns.

(b) Chooses N and links its 3 p cost to the maximum of 5 p. **B1**

(b) Links N supporting 3 N to the minimum requirement of 2 N. Award independently if the choice is clear from this comparison. **B1**

(b) Answer: N costs 3 p, below 5 p, and supports 3 N, above the required 2 N.

Question 6

(a) Raised fibres/nap trap a layer of air. **B1**

(a) Trapped air insulates or reduces heat loss/heat transfer; accept air is a poor conductor. **B1**

(a) Answer: The raised fibres trap air near the surface. This air layer reduces heat transfer from the wearer.

(b) Benefit supported by data: softer (5 versus 2) for skin contact, or warmer (4 versus 2) for the neck. Accept an unambiguous directional comparison instead of numbers. **B1**

(b) Drawback supported by data: more snagging (6 versus 1), so the surface can catch more readily. Accept an unambiguous directional comparison. Do not infer poorer wash durability from these results. **B1**

(b) Answer: It has a higher softness rating (5 rather than 2), but catches more snags (6 rather than 1).

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