

FOR OFFICIAL USE



National
Qualifications
2023

Mark

X823/77/01

**Engineering Science
Answer booklet**

TUESDAY, 16 MAY

1:00 PM – 3:30 PM



* X 8 2 3 7 7 0 1 *

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day

Month

Year

Scottish candidate number

Write your answers clearly in this answer booklet. You must clearly identify in the margin the question number you are attempting.

Worksheets for questions 1 (a), 8 (a) and 8 (e) are included. Write your answers to these questions clearly in the spaces provided.

Use **blue** or **black** ink. Sketches, diagrams and graphs may be drawn in pencil.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.



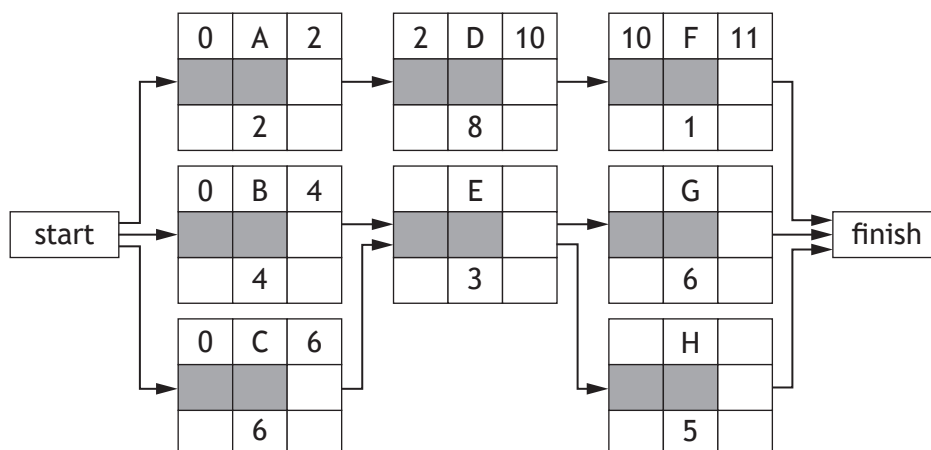
* X 8 2 3 7 7 0 1 0 1 *

Worksheet for question 1 (a)

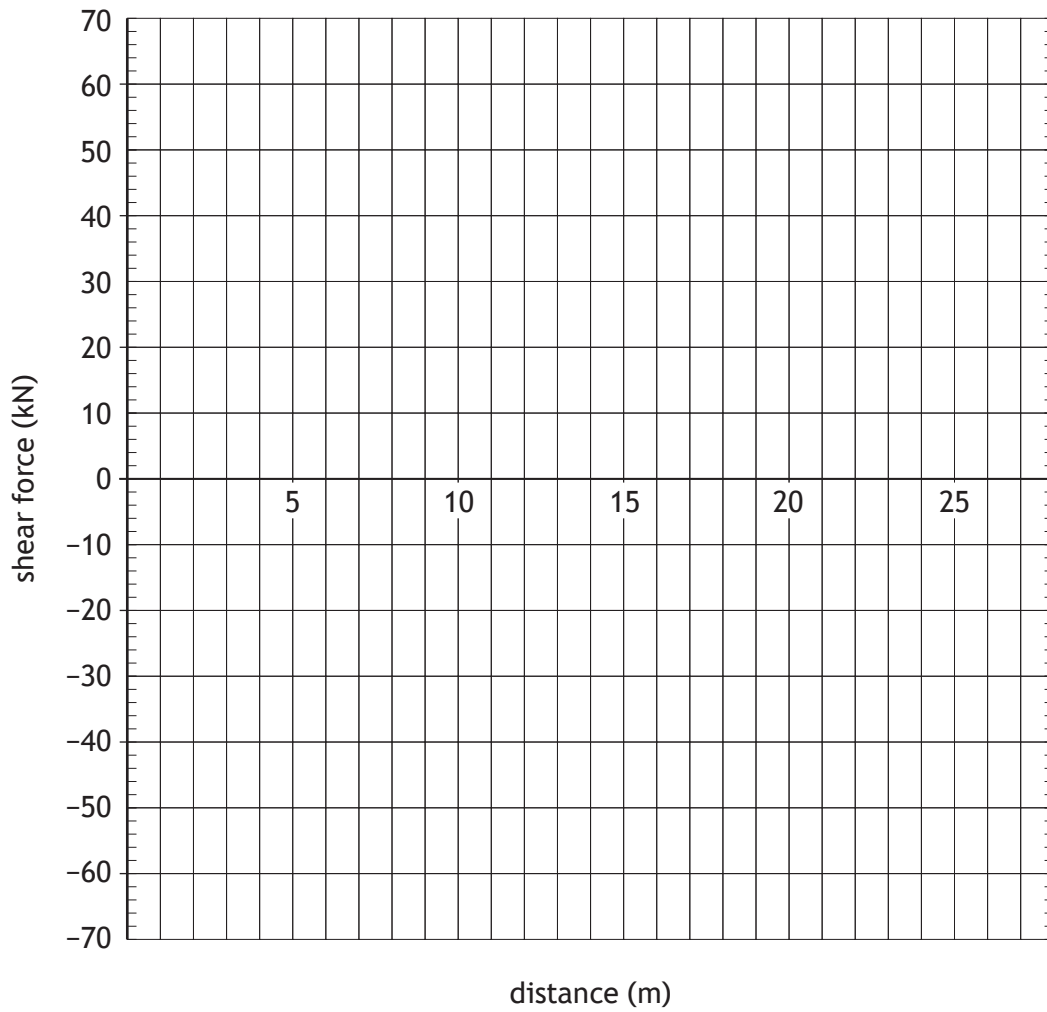
Stage	Precedence	Duration (weeks)
A	--	2
B	--	4
C	--	6
D	A	8
E	B, C	3
F	D	1
G	E	6
H	E	5

- STG – stage
- DUR – duration
- EST – earliest start time
- EFT – earliest finish time
- LST – latest start time
- LFT – latest finish time
- FLT – float

EST	STG	EFT
		FLT
LST	DUR	LFT



Worksheet for question 8 (a)



* X 8 2 3 7 7 0 1 0 3 *

Worksheet for question 8 (e)

Strain Gauge	Location
R_{G1}	
R_{G2}	
R_{G3}	
R_{G4}	

[END OF WORKSHEETS]





ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 0 5 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 0 6 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 0 7 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 0 8 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 0 9 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 0 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 1 *

ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 2 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 3 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 4 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 5 *

ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN





ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 7 *

ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 8 *

ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 1 9 *

ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 2 2 *



ENTER
NUMBER
OF
QUESTION

DO NOT
WRITE IN
THIS
MARGIN



* X 8 2 3 7 7 0 1 2 3 *

For marker's use

Question	Marks

