



Regional
NSW

CANDIDATE NUMBER: CAN / _____

EXAMINATION: UNDERMANAGER underground coal mines

EXAM PAPER: UB1 – Mining Legislation

DATE: Wednesday 6 April 2022

EXAMINATION

BOOKLET

CANDIDATE NUMBER:

CAN / _____

Question Number	Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
1	a	20		
	Subtotal	20		
2	a	12		
	b	4		
	c (i)	2		
	c (ii)	2		
	Subtotal	20		
3	a	8		
	b	8		
	c	4		
	Subtotal	20		
4	a	9		
	b	11		
	Subtotal	20		
5	a	2		
	b	15		
	c	3		
	Subtotal	20		
PAPER	TOTAL	100		<i>Marks checked by:</i>



(UB1)

Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
UNDERMANAGER of underground coal mines**

Mining Legislation Paper

Wednesday 6 April 2022
11:50pm to 1:00pm (60 min + 10 min reading time)

Tocal College

INSTRUCTIONS TO CANDIDATES

All five (5) questions are to be attempted.

All questions are of equal value - 20 marks each

10 minutes reading time is allowed prior to the start of the examination

Unless otherwise stated all references to Act and Regulations are to the

Work Health and Safety Act 2011

Work Health and Safety Regulation 2017

Work Health and Safety (Mines and Petroleum Sites) Act 2013

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

Explosives Act 2003

Explosives Regulation 2013

Explosives Australian Standard AS 2187

ANSWER BOOKLET

- A HIGHLIGHTER ONLY (no pen/pencil etc) can be used in this part of the exam paper during reading time
- If you have a question raise your arm and wait for an exam supervisor
- Answers are to be written in the allocated spaces within this booklet ONLY
- Answers must be written in pen however, drawings may be completed in pencil
- This booklet is not to be altered in any way, pages are not to be added or removed

Question 1 (total 20 marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW) Clause 62 requires that the mine operator must ensure that a ventilation control plan is prepared to provide for the management of all aspects of ventilation at the mine.

List any 10 of the requirements in this Clause

	/20
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Question 2 (total 20 marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW) Clause 179 specifies Dangerous Incidents requiring notification under Section 14 of the Work Health and Safety (Mines and Petroleum) Act 2013 (NSW).

a) List any 8 of the Dangerous Incidents requiring notification **(12 marks)**

b) State the notification requirements of Dangerous Incidents under section 15 and 16 of the Work Health and Safety (Mines and Petroleum Sites) Act 2013 (NSW) in respect of: **(4 marks)**

- i) The timing of notification
- ii) Who is required to be notified

c) Section 17 of the Work Health and Safety (Mines and Petroleum Sites) Act 2013 (NSW) outlines the 'Duty to preserve incident sites'.

- (i) What is required from an inspector before a mine operator is permitted to disturb an incident site? **(2 marks)**

- (ii) Section 17(3) specifies circumstances where an incident site is permitted to be disturbed. State two of the circumstances. **(2 marks)**

	/20
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Question 3 (total 20 marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW) Clause 100

Self Rescuers (3) has several requirements of the mine operator.

a) Fill in the missing words relating to Clause 100 **(8 marks)**

In the case of a worker at the mine, any such training must involve training the worker in a _____ in the _____ and _____ of each type of self-rescuer that the worker may be required to use—

(a) before _____, and

(b) every _____ after that

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW) Clause 102 refers to competent persons at surface.

b) List the four requirements that the mine operator of an underground mine must ensure at any time that persons are underground **(8 marks)**

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW) Schedule 10 clause 6 prescribes the statutory function of an Undermanager.

c) What are these requirements? **(4 marks)**

Question 4 (total 20 marks)

a) Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW) Clause 52 (Ground and Strata Support) outlines three requirements of the mine operator in respect of unsupported ground or strata. List the three requirements. **(9 marks)**

b) A Ground and Strata Principal Hazard Management Plan (under Schedule 1 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW)) must include three requirements for the proposed widening of an existing roadway to a width greater than 5.5 metres. State those three requirements. **(11 marks)**

c) State the waiting period following submission to the regulator of a high-risk activity for sealing (3 marks)

	/20
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END OF QUESTIONS
END OF PAPER

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Regional
NSW

CANDIDATE NUMBER: CAN / _____
EXAMINATION: UNDERMANAGER underground coal mines
EXAM PAPER: UB2 – Mine Ventilation
DATE: Thursday 6 April 2022

EXAMINATION

BOOKLET

CANDIDATE NUMBER: CAN / _____

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
1	a		10		
	b		40		
	c		10		
	d		20		
	e		20		
	Subtotal			100	
2	a		70		
	b		30		
	Subtotal			100	
PAPER	TOTAL				<i>Marks checked by:</i>
			200		



Regional
NSW

(UB2)

*Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
UNDERMANAGER of underground coal mines**

Mine Ventilation Paper

Thursday 6 April 2022
1:35pm to 3:45pm (120 min = 10 mins reading time)

Total College, Paterson

INSTRUCTIONS TO CANDIDATES

All questions are to be attempted.

Question 1 and 2 are of equal value - **100 marks each**.

10 minutes reading time is allowed prior to the start of the examination.

**Please write your candidate number
on your mine plan,
above the mine name box,
to be seen when folded back in its plastic cover**

ANSWER BOOKLET

- A HIGHLIGHTER ONLY (no pen/pencil etc) can be used in this part of the exam paper during reading time
- If you have a question raise your arm and wait for an exam supervisor
- Answers are to be written in the allocated spaces within this booklet **and the provided mine plan ONLY**
- Answers must be written in pen however, drawings may be completed in pencil/coloured pencil
- This booklet is not to be altered in any way, pages are not to be added or removed

Question 1

Duncan Colliery workings commence at the toe of the highwall from the discontinued Duncan Opencut mine. Working are shown on the attached plan.

The colliery works the “Great Southern” seam, which has a medium propensity to spontaneous combustion, is 3.4 metres thick and is overlaid by 4 metres of quartz bearing sandstone and mudstone. The working section is the full seam thickness of the “Great Southern” seam.

The immediate strata below the “Great Southern” seam, is a 1.0-metre-thick reasonably competent bed of shale. There are a number of thin coal seams in the overlying strata.

The Duncan Colliery workings are accessed via five short portal drivages at the base of a highwall in a discontinued open cut coal mine. One of these portal drivages is connected to the Main Ventilation Fans.

The “Great Southern” seam is moderately gassy with a moderate permeability. Total in situ-seam gas content is typically 8 m³/t, with a CO₂:CH₄ ratio of 20:80. Approximately 70% of the insitu gas in the cut coal is liberated during the production process.

Typical roof support is 6 x 2.1 metre bolts and a 1 metre x 4.8 metre mesh module per metre. Ribs are friable and prone to failure in the upper third of the rib, requiring support with mesh and 2 x 1.2 metre point anchor bolts every metre.

The mine produces Coking coal from five Continuous Miners in development units seven days per week and a longwall panel (LW 6) five days per week.

The mine produces approximately 3.5 million tonnes per year. Two CM's are advancing the Tail Gate 9 headings (Inbye of LW 6), whilst a single CM is being used to develop a Main gate for the new Longwall panel LW 8.

Two further CM's are advancing the Mains headings

Note LW 6, LW 7 and LW 8 have all had to be shortened due to an igneous intrusion i.e. a sill.



IGNEOUS SILL

Mine Entries

LW1

LW2

LW3

LW4

LW5

Upcast Shaft

LW8

LW7

LW6

LW9

LOCATION	DUNCAN COLLIERY
SEAM	GREAT SOUTHERN
DRAWN	S.C.
CHECKED	S.S.
APPROVED	K.L.
SCALE	Refer to scalebar

**DUNCAN COLLIERY
PLAN SHOWING CURRENT &
PROPOSED WORKINGS**

DATE 10-03-2022

On the accompanying plan:

- a) Show the location of all the production faces. **(10 Marks)**

/10

- b) Ventilate the plan using the code of symbols specified in the relevant Australian Standards, Mine Plans – Preparation and Symbols. Ventilation design should address any identified ventilation related hazards / challenges **(40 Marks)**

/40

- c) Document the air quantities you would expect to be entering each production panel measured at the commencement of the hazardous zone. Indicate why these quantities have been chosen. **(10 Marks)**

/10

- d) Calculate the general body methane and carbon dioxide content in the LW 6 panel return whilst the LW is producing coal (clearly state assumptions you are relying upon in these calculations and why you have chosen these assumptions). **(20 Marks)**

/20

- e) Calculate the main ventilation duty point and fan power requirements to ventilate this mine. (clearly state assumptions you are relying upon in these calculations and why you have chosen these assumptions). **(20 Marks)**

20

Note: Candidates must show all calculations.

Clearly state assumptions you are relying upon in these calculations and why you have chosen these assumptions

Ensure that your candidate examination number is clearly stated on the plan

Question 2 (Worth a total of 100 marks)

Question 2

The following are short answer questions on a range of matters which should be answered in dot point format

From the data supplied in Question 1 and in relation to the mine layout as per the attached plan:

- a) Identify and list the relevant hazards associated with the ventilation arrangements and those issues which must be addressed by, the ventilation management system. Your answer should include ventilation control measures and any other identified major hazard management requirements associated with the ventilation. **(70 marks)**

Multiple horizontal lines for text entry.

b) Considering the need for scrutiny on monitoring for Spontaneous Combustion an appreciation of the TARPS is required. Complete the Question 2 (b) TARP table below with the details you expect to be included in the Duncan Colliery, Spontaneous Combustion Longwall TARP. **(30 Marks)**

/30

END OF QUESTION 2
END OF PAPER

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Question 2 (b) TARP table

TRIGGERS	Normal	Level 1	Level 2	Level 3	Level 4
Longwall – general Body (normal coal)	CO make <= 10 L/min CO goaf stream <5ppm				As per Level 3 indicator AND Flammable mix in affected area
Active Goaf (seal sample)	CO <50 ppm GR < 0.2				As per Level 3 indicator AND Flammable mix in affected area
TRIGGERS	Normal	Level 1	Level 2	Level 3	Level 4
Control Room Operator	Process bag samples as required	Review trends of alarms Notify Undermanager	Review trends of alarm Notify Undermanager	Review trends of alarm Notify Undermanager Notify Ventilation officer	Review trends of alarm Notify Undermanager Notify Ventilation Officer Advise persons to withdraw from the mine
Shift Undermanager					



CANDIDATE NUMBER: CAN / _____
EXAMINATION: UNDERMANAGER underground coal mines
EXAM PAPER: UB3 – Coal Mining Practice
DATE: Thursday 7 April 2022

EXAMINATION

BOOKLET

CANDIDATE NUMBER: CAN / _____

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
Select and attempt a total of 5 only of 8 questions	1	a	4		
		b	12		
		c	4		
		Subtotal	20		
	2	a	2		
		b	6		
		c	3		
		d	1		
		e	1		
		f	7		
		Subtotal	20		
	3	a	2		
		b	4		
		c	4		
		d	6		
		e	4		
		Subtotal	20		

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
	4	a	12		
		b	4		
		c	4		
		Subtotal	20		
	5	a	4		
		b	2		
		c	2		
		d	6		
		e	2		
		f	2		
		g	2		
		Subtotal	20		
	6	a	14		
b		6			
Subtotal		20			
7	a	2			
	b	6			
	c	6			

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
		d	4		
		e	2		
		Subtotal	20		
	8	a	4		
		b	12		
		c	4		
		Subtotal	20		
PAPER	TOTAL		100		<i>Marks checked by:</i>



(UB3)

*Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
UNDERMANAGER of underground coal mines**

Coal Mining Practice Paper

8:50am to 12:00pm (3hrs + 10 min reading time)

TOCAL College

INSTRUCTIONS TO CANDIDATES

INSTRUCTION TO CANDIDATES

You must **select five of the eight questions** to attempt.

All questions are of equal value - 20 marks each

10 minutes reading time is allowed prior to the start of the examination.



Question 1 (total 20 marks)

You're an undermanager at a modern longwall mine which is extracting the lower 3.8 meters of a 7-meter seam. Seam gas composition is predominately carbon dioxide and gas drainage is not required. Poor strata conditions have recently been impacting production with several roof falls requiring PUR for consolidation.

You receive a call from the LW Deputy advising that whilst cutting to the tailgate 2 large pieces of stone have fallen out stopping production. The crew has attempted to break the pieces of stone up with the shearer without success. The deputy has requested to shot fire the stone to break it up.

- a) List four (4) requirements in the Explosives Control Plan for the use of explosives underground **(4 marks)**

	/4
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- b) List six (6) hazards that should be considered as part of this recovery and provide a summary of how each hazard will be managed **(12 marks)**

	/12
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c) What are the limitations on the number of shot holes that can be fired in a round in this instance **(4 marks)**

	/4
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Question 2 (total 20 marks)

You're an Undermanager in a small bord and pillar mine that will soon begin extracting coal by pillar extraction. You have been tasked by the mining engineering manager with preparing a pillar extraction management plan.

a) What teams should be consulted with in preparation for the development of this new management plan? **(2 marks)**

	/2
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b) Briefly outline the steps that should be taken when developing a new management plan? **(6 marks)**

	/6
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c) What relevant parts of legislation would you reference when conducting your risk assessment? **(3 marks)**

	/3
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d) Which high risk activity is most relevant to pillar extraction? **(1 mark)**

	/1
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e) What is the waiting period for the most relevant high risk activity? **(1 mark)**

	/1
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f) Following the development of the pillar extraction management, the mine is now in operation utilizing this method. You receive a phone call from the deputy responsible in the pillar extraction panel informing you that the strata in the immediate mining area has deteriorated and they are requesting to abandon several lifts.

Briefly explain what process should be referred to when varying an approved sequence plan in pillar extraction? **(7 marks)**

	/7
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Question 3 (total 20 marks)

You are the undermanager of a longwall mine which is about to commence extraction in a new panel. The start position of the longwall panel is overlain by a thick sandstone channel and initial goaf formation is not expected until 40 metres retreat. The mine has moderate methane gas emissions. The longwall face width is 225metres.

- a) List two (2) potential hazards that may be present prior to initial caving and goaf formation **(2 marks)**

	/2
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- b) List four (4) practical controls that can be implemented to mitigate the hazards that have been identified in (a) (that is, prior to initial caving and goaf formation)? **(4 marks)**

	/4
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- c) List five (5) potential hazards at the time of initial goaf formation? **(4 marks)**

	/4
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d) List six (6) practical controls that can be implemented to mitigate the hazards that have been identified that may occur on initial caving and goaf formation? Use drawings to illustrate controls as required. **(6 marks)**

	/6
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e) In the event that an initial goaf fall in a new extraction panel causes significant damage to the ventilation control devices at the outbye end of the longwall panel, state four immediate steps that should be undertaken by the shift undermanager on becoming aware of the issue? **(4 marks)**

	/4
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Question 4 (total 20 marks)

You are the day shift undermanager at a longwall mine and you have been tasked with managing the installation of a new longwall drive head and loop take up (LTU). The mine extracts the lower 3.4 meters of a 9-meter seam. The seam above the working section includes several stone bands up to 300mm in thickness and the immediate strata overlying the seam consists a sandstone band 3 meters thick overlain by a 1-meter claystone band. the immediate floor below the seam consists of a competent sandstone.

The drive head, loop take up chamber dimensions are 7 meters wide, 5 meters high and 80 metres long.

The design of the drive head excavation requires a ramp up in the seam and then brushing out the lower part of the seam to arrive at the finished dimensions.

- a) As project manager of this installation list the hazards associated with this project and the controls and checks that should be put in place to ensure the project is successfully delivered. **(12 marks)**

	/12
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b) What correspondence would be required with the Resources Regulator for this excavation and what is the waiting period for this activity. (4 marks)

	/4
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c) You have been contacted by the nightshift undermanager who has advised that the afternoon shift have performed an off-centre drivage of 600mm for 6 meters. The nightshift crew have brought the drivage back on centre. What steps should be taken to correct this problem? (4 marks)

	/4
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Question 5 (total 20 marks)

You're an undermanager at a modern longwall mine with a low in-situ gas content, which is currently facing difficult geological conditions towards the end of the development gate road panel. The mining engineering manager has tasked you with investigating an option to drive a new face road approximately 300m outbye of the original planned location for the face road.

The longwall block is 270m wide, with no planned cut-throughs to be driven in this new face road.

a) What key stakeholders would you consult with regarding this project? **(4 marks)**

	/4
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b) List two (2) notifications required to be submitted to the Resources Regulator, including waiting periods **(2 marks)**

	/2
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c) How can a waiting period be reduced from the prescribed timeframe relating to high risk activities? **(2 marks)**

	/2
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d) List six (6) hazards that should be considered as part of this project and provide a brief summary of how each hazard will be managed **(6 marks)**

	/6
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e) What must be carried out before any significant change is to occur to the ventilation system? **(2 marks)**

	/2
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f) Briefly explain how a ventilation survey should be completed during development mining to ensure legislative compliance. **(2 marks)**

	/2
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g) Complete the following ventilation calculation **(2 marks)**

Roadway width = 5.5m
Roadway height = 3.2m
Velocity = 2.5m/s

	/2
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Question 6 (total 20 marks)

You're the nightshift undermanager at a mine where access is via a 1:3 drift and a shaft winder. The mine works a seam at a depth of over 400m. The primary access to the mine is via the shaft winder. You have been contacted by control that the shaft winder has stopped 50 m down from the surface landing with 4 people inside.

The winder has been out of service for over 30 minutes and multiple attempts have been made by the surface competent person to reset the winder without success.

- a) Describe the immediate actions the undermanager should take, along with any instructions **(14 marks)**

	/14
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- b) What notifications would be required under the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 for this event **(6 marks)**

	/6
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Question 7 (total 20 marks)

You are an Undermanager at a mine that over the past 2 years has experienced several roof falls in active development panels.

The mining engineering manager and technical services team are looking to raise the floor horizon and roof horizon by around 500mm above the current target working seam and have tasked you to develop a strategy to implement this. The current roof horizon has around 2m of overlying coal tops.

a) List four (4) parts of the safety management system that should be reviewed as part of this proposed change **(2 marks)**

	/2
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b) Describe how the change to the current mining horizon should occur? **(6 marks)**

	/6
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c) List six (6) items that an undermanager should be inspecting for during this change, including how and why these inspections should occur. **(6 marks)**

/6

d) List and briefly describe four (4) causes for ineffective strata monitoring? **(4 marks)**

/4

e) Explain where and why the anchor points are set at a certain position relating to 2-point tell-tale? **(2 marks)**

/2

Question 8

As undermanager on weekend night shift, you are on the surface when you receive a phone call from the longwall deputy during his first inspection of the longwall face during a production shift reporting higher than normal methane levels in the tailgate roadway.

The deputy has provided you with the following information from their inspection of the tailgate roadway 50m outbye the longwall face:

- Methane concentration is normally 0.8% but now is at 1.6% (with no production at the time of inspection)
- The tailgate ventilation quantity has been checked and is reduced from a normal quantity of 50m³/second to 25m³/second

a) List two potential causes of the reduced tailgate ventilation quantity **(4 marks)**

	/4
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b) What actions should be taken by the Undermanager to control the immediate hazards and to better understand the causes of the ventilation reduction and enable a corrective action plan to be developed? Consider the resources/personnel available at the mine which the undermanager can deploy or issue directives to. **(12 marks)**

	/12
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- c) Assuming during inspection, an outbye deputy discovers the cause of the ventilation reduction is due to a broken fire water pipe line in the Mains panel travel road pouring into the Mains return roadway and almost filling a localised swilly, list the actions that should be taken by the undermanager to enable resumption of normal production operations. Note that it is now determined that both the Mains development panel and the longwall panel have restricted ventilation quantities. **(4 marks)**

	/4
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END OF QUESTIONS

END OF PAPER

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