GRADUATE STANDARDIZED TEST

Quantitative Reasoning

AUA

Pilot Test, 20 Dec 2025
60 minutes

First Name: _____

Last Name: _____

Email Address: _____

Country of Residence: _____

University name (graduated from or currently enrolled):

_____

Current Academic Status (check one):

☐ Undergraduate Senior ☐ Holder of Bachelor's degree

☐ Master's student (1st year) ☐ Master's student (2nd year) ☐ Other

Undergraduate field of study:

_____

Graduate field of study (if any):

_____

ANSWER SHEET

Instructions: Fill all circles or squares completely. For Numeric-Entry questions, write digits and, where necessary, decimal points, fractions, negative signs CLEARLY inside the box.

SECTION A — Answer Grid

Questions 1–6 (Select ONE Answer: A–E)

1	A ○	B ○	C ○	D ○	E ○
2	A ○	B ○	C ○	D ○	E ○
3	A ○	B ○	C ○	D ○	E ○
4	A ○	B ○	C ○	D ○	E ○
5	A ○	B ○	C ○	D ○	E ○
6	A ○	B ○	C ○	D ○	E ○

Questions 7–8 (Select ALL that apply)

7	A ☐	B ☐	C ☐	D ☐	E ☐
8	A ☐	B ☐	C ☐	D ☐	E ☐

Questions 9–10 (Numeric Entry)

Question 9

Question 10

Questions 11–15 (Quantitative Comparison)

11	A ○	B ○	C ○	D ○
12	A ○	B ○	C ○	D ○
13	A ○	B ○	C ○	D ○
14	A ○	B ○	C ○	D ○
15	A ○	B ○	C ○	D ○

Question 16 (Numeric Entry)

Question 16

Questions 17–19

17	A ○	B ○	C ○	D ○	E ○
18	A □	B □	C □	D □	E □
19	A ○	B ○	C ○	D ○	E ○

Question 20 (Quantitative Comparison)

20	A ○	B ○	C ○	D ○

SECTION B — Answer Grid

Questions 21–30 (Select ONE Answer: A–E)

21	A ○	B ○	C ○	D ○	E ○
22	A ○	B ○	C ○	D ○	E ○
23	A ○	B ○	C ○	D ○	E ○
24	A ○	B ○	C ○	D ○	E ○
25	A ○	B ○	C ○	D ○	E ○
26	A ○	B ○	C ○	D ○	E ○
27	A ○	B ○	C ○	D ○	E ○
28	A ○	B ○	C ○	D ○	E ○
29	A ○	B ○	C ○	D ○	E ○
30	A ○	B ○	C ○	D ○	E ○

ANSWER CORRECTION AREA

Use this section only if you need to correct an answer already marked above.

Q#	Correct Answer	Remarks / Examiner Use

End of the Answer Sheet

Candidates may use any area on pages 4–16 for their draft calculations and notes.

SECTION A

20 Questions

In each of the questions 1-6, ONLY one answer is correct. Record your answers on the answer sheet.

1 In the sequence

$$1,\ -2,\ 3,\ -4,\ 5,\ 1,\ -2,\ 3,\ -4,\ 5,\ 1,\ -2,\ 3,\ \ldots\ ,$$

the first 5 terms repeat without end. What is the sum from the 144th term to the 148th term?

(A) 0

(B) -2

(C) 5

(D) 3

(E) -4

2 How many points with integer coordinates lie *strictly inside* the region bounded by the x-axis and the graph of

$$y = x(4 - x)?$$

(A) 6

(B) 7

(C) 8

(D) 9

(E) Infinitely many.

3 The price of an item increased by $p\%$ from 2023 to 2024 and then decreased by $p\%$ from 2024 to 2025. By what percent has the price changed from 2023 to 2025?

(A) Went up by $\frac{p^2}{100}\%$.

(B) Went up by $\frac{p}{200}\%$.

(C) Did not change.

(D) Went down by $\frac{p^2}{100}\%$.

(E) Went down by $\frac{p}{200}\%$.

4 At a school, students may join a math club, a science club, or both. A total of 360 students belong to at least one of these two clubs. The ratio of the number of students in the math club to the number in the science club is 7 : 5. If 12 students belong to both clubs, how many students belong only to the math club?

(A) 205

(B) 198

(C) 143

(D) 348

(E) 217

5 The sum of the reciprocals of three consecutive positive integers is

$$\frac{13}{12}.$$

Find the sum of these three integers.

(A) 7

(B) 6

(C) $\frac{12}{13}$

(D) 8

(E) 9

6 Which of the following numbers is the greatest?

(A) 2^{49}

(B) 5^{21}

(C) 4^{25}

(D) 25^{10}

(E) 10^{14}

In each of the questions 7-8, MULTIPLE answers may be correct.
Each of the questions 9–10 is a Numeric-Entry question.
Record your answers on the answer sheet.

7 Determine the correct statements below about divisors of $N = 360$. *Select all that apply.*

(A) N has exactly 3 prime divisors.

(B) N has exactly 24 positive divisors.

(C) N has exactly 6 positive divisors.

(D) N has exactly 6 prime divisors.

(E) N has more divisors than $N + 1$.

8 Let

$$f(x) = 4(x + 1)(2x + 1)$$

and

$$g(x) = \frac{(2x + 1)^3 - (2x + 1)^2}{2x}.$$

Which of the following values of x satisfies the equation

$$f(x) = g(x)\,?$$

Select all that apply.

(A) -0.2

(B) -0.5

(C) 0

(D) 1.5

(E) -1.5

9 Given $a^2 + a = 5$, evaluate $a^4 + 2a^3 + a^2 + 1$.

10 Machine A, working alone at a constant rate, produces L liters of juice in 24 minutes. Machine B, working alone at a constant rate, produces the same L liters of juice in 36 minutes. If both machines operate simultaneously at their respective constant rates, how many minutes will it take them to produce L liters of juice together?

In questions 11-15, you are asked to compare Quantity A and Quantity B. Choose ONLY one answer. Focus on comparison rather than calculating exact values whenever possible. Record your answers on the answer sheet.

11 Let $x > 0$.

Quantity A: x^{-7}

Quantity B: $-x^7$

(A) Quantity A is greater.

(B) Quantity B is greater.

(C) The two quantities are equal.

(D) None of the above is correct.

12 Let n be a positive integer.

Quantity A: $|n-1| + |n-999|$

Quantity B: 1000

(A) Quantity A is greater.

(B) Quantity B is greater.

(C) The two quantities are equal.

(D) None of the above is correct.

13 A driver travels from City A to City B at a constant speed of 75 miles per hour. On the return trip, he drives half of the total distance at 60 miles per hour and the other half at 90 miles per hour.

Quantity A: The total travel time from City A to City B

Quantity B: The total travel time from City B to City A

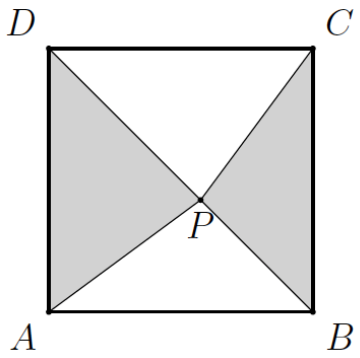
(A) Quantity A is greater.

(B) Quantity B is greater.

(C) The two quantities are equal.

(D) None of the above is correct.

14 Let $ABCD$ be a square below.



Quantity A: The area of white (unshaded) region

Quantity B: The area of gray (shaded) region

(A) Quantity A is greater.

(B) Quantity B is greater.

(C) The two quantities are equal.

(D) None of the above is correct.

15 Let D be the decimal form of the fraction $\frac{3}{7}$.

Quantity A: The hundredth digit to the right of the decimal point in D

Quantity B: 7

(A) Quantity A is greater.

(B) Quantity B is greater.

(C) The two quantities are equal.

(D) None of the above is correct.

Questions 16–18 refer to the following information.

The sales (in thousands of units) of the five best-selling smartphone models in 2024 are listed in the table below.

Model	Sales (in thousands)
Model A	5,600
Model B	4,300
Model C	3,900
Model D	2,750
Model E	1,820

The total smartphone sales worldwide in 2024 were 45,000,000 units.

16 *Numeric-Entry Question:*
The three best-selling smartphone models in 2024 accounted for what percent of the total sales of the five top-selling models?
Enter your answer as a *whole number* (rounded to the nearest percent) on the answer sheet.

17 *Multiple-Choice Question (Select ONE Answer):*
By approximately what percent did the sales of Model A exceed the sales of Model D in 2024?
Select the closest answer and record it on the answer sheet.

(A) 80%

(B) 100%

(C) 120%

(D) 140%

(E) 160%

18 *Multiple-Choice Question (Select ALL that apply):*
Which of the following models had sales that differ by less than 1 million units from the sales of Model C?
Record your answer on the answer sheet.

(A) Model A

(B) Model B

(C) Model D

(D) Model E

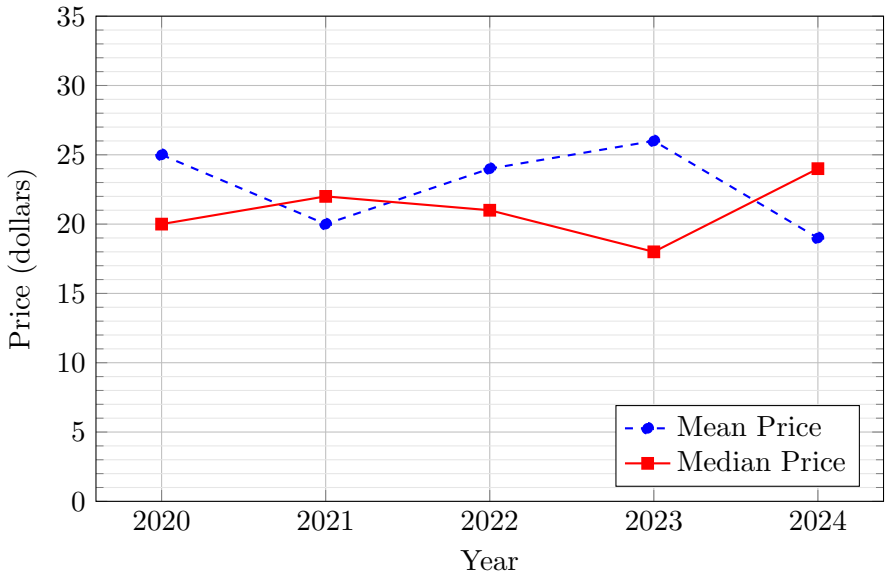
(E) None of the above.

Questions 19–20 refer to the following information.

BOOKS SOLD IN CITY X, 2020–2024

Year	Number of Books Sold
2020	450
2021	380
2022	420
2023	460
2024	360

MEAN AND MEDIAN PRICES OF BOOKS SOLD IN CITY X (in dollars)



19 *Multiple-Choice Question (Select ONE Answer):*
Which year had the greatest difference between the mean price and median price of books sold? Record your answer on the answer sheet.

(A) 2020

(B) 2021

(C) 2022

(D) 2023

(E) 2024

20 *Quantity-Comparison Question (Select ONE Answer):*

Quantity A: Total revenue in dollars gained from sales in 2020 and 2021.

Quantity B: Total revenue in dollars gained from sales in 2023 and 2024.

(A) Quantity A is greater.

(B) Quantity B is greater.

(C) The two quantities are equal.

(D) None of the above is correct.

Record your answer on the answer sheet.

SECTION B

10 Questions

In each of the questions 21-30, ONLY one answer is correct. Record your answers on the answer sheet.

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21 Which of the following series converges?

(A) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$

(B) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$

(C) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2}$

(D) $\displaystyle\sum_{n=1}^{\infty} 1$

(E) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{n+1}$.

22 Let A be a 3×3 matrix with $\det(A) = 2$. What is $\det(A^{-1})$?

(A) $\frac{1}{2}$

(B) $-\frac{1}{2}$

(C) $\frac{1}{8}$

(D) -2

(E) $\frac{1}{4}$

23 What is the minimum value of

$$f(x, y) = x^2 + xy + y^2 \ ?$$

(A) $\sqrt{2}$

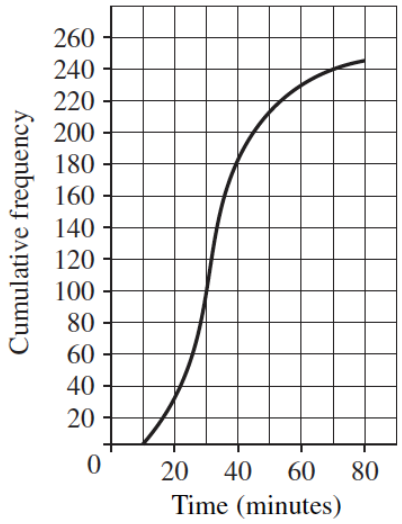
(B) 0

(C) $-\sqrt{2}$

(D) 1

(E) -3

24 The cumulative frequency curve below shows the amount of time 250 customers spend shopping in a supermarket.



Estimate the number of customers who spend between 20 and 40 minutes shopping. Choose the closest answer.

(A) 40

(B) 180

(C) 7

(D) 145

(E) 160

25 Let

$$A = \begin{pmatrix} 1 & 0 & -2 \\ c & -9 & -c \\ 0 & c & -1 \end{pmatrix}.$$

For how many values of c the matrix A is non-invertible?

(A) 1

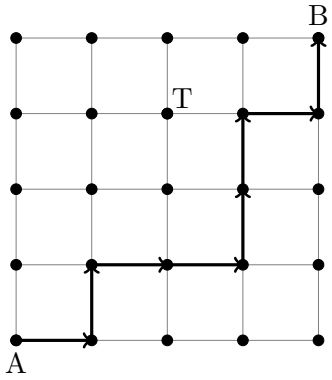
(B) 2

(C) 3

(D) 4

(E) Infinitely many.

26 Consider the 5×5 grid of points shown below. Suppose that, starting at the point labelled A, you can go one step up or one step to the right at each move. This procedure is continued until the point labelled B is reached. An example of such a path is demonstrated in the figure.



If such a path from A to B is taken randomly, what is the probability that it will pass through the point T, shown on the grid?

(A) $\frac{1}{7}$

(B) $\frac{2}{7}$

(C) $\frac{3}{7}$

(D) $\frac{4}{7}$

(E) None of the answers above is correct.

27 A random variable X takes the values -1, 0, and 1 with equal probabilities. Find the variance of X. Choose the closest answer.

(A) 0.67

(B) 0.33

(C) 0.5

(D) 0.8

(E) 2

28 A warehouse manager is planning a rectangular storage area using 40 meters of fencing. Which of the following is the maximum possible area of the storage space?

(A) $80\,m^2$

(B) $100\,m^2$

(C) $400\,m^2$

(D) $1600\,m^2$

(E) None of the answers above is correct.

29 We toss a fair coin repeatedly until tails appears for the first time. What is the expected number of tosses?

(A) 1

(B) 2

(C) 2.5

(D) 3.5

(E) 4

30 Find the average value of $f(x, y) = 2x(y + 1)$ over the rectangle $[0, 1] \times [0, 3]$.

(A) 2.5

(B) 3

(C) 3.5

(D) 4

(E) 4.5

Scratch Paper