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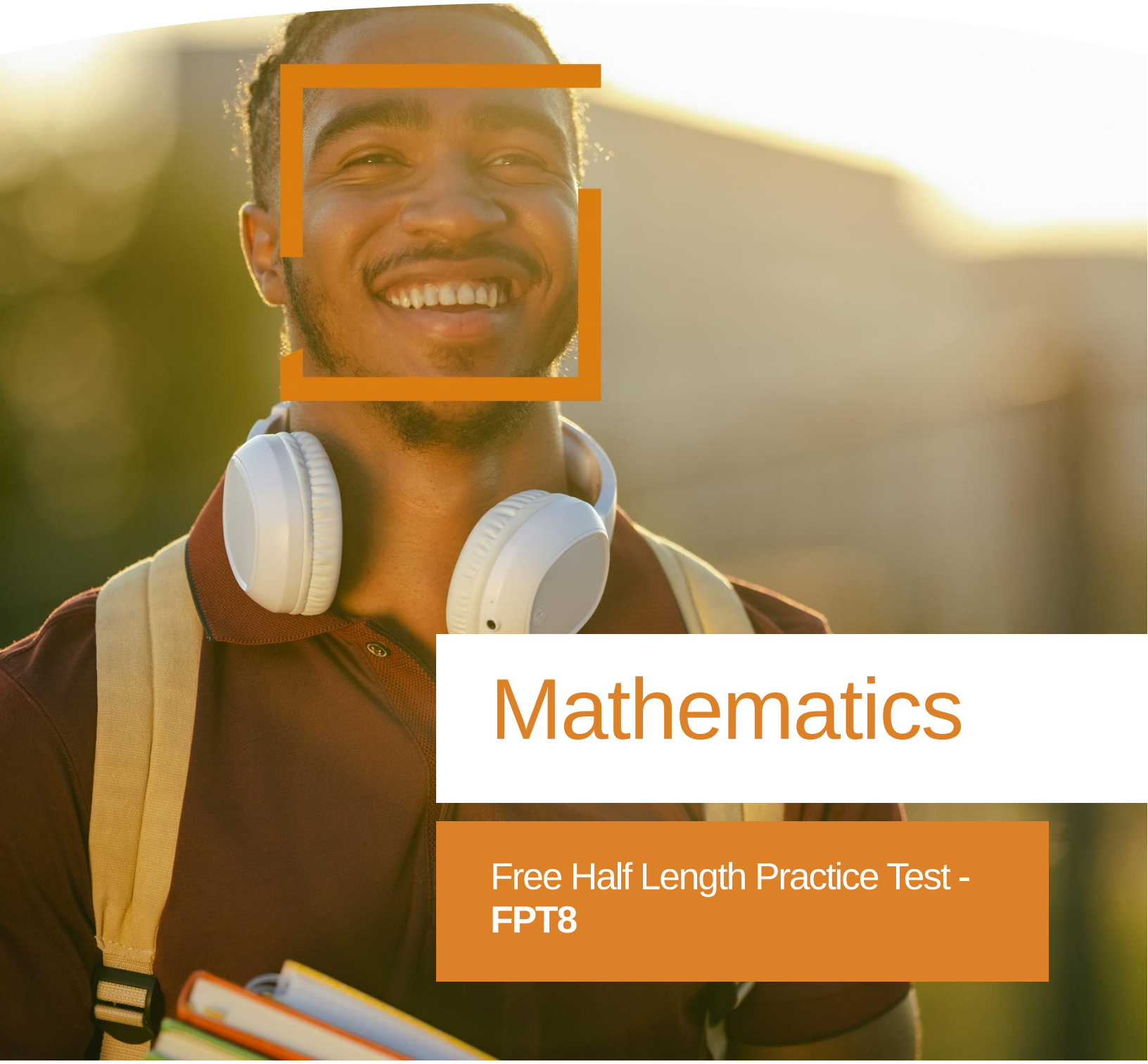


Mathematics

Free Half Length Practice Test - **FPT8**

Version: 2.0 Date: April 4, 2024 Classification: Public

- Get the HiSET® testing experience.
- Answer questions developed by the test maker.
- Find out if you're ready for the actual subtest.

Formula Sheet

Perimeter / circumference

Rectangle

Perimeter = 2(length) + 2(width)

Circle

Circumference = 2π (radius)

Area

Circle

Area = π $(\text{radius})^2$

Triangle

Area = $\frac{1}{2}$ (base)(height)

Parallelogram

Area = (base)(height)

Trapezoid

Area = $\frac{1}{2}$ (base_1 + base_2)(height)

Volume

Prism/Cylinder

Volume = (area of the base)(height)

Pyramid/Cone

Volume = $\frac{1}{3}$ (area of the base)(height)

Sphere

Volume = $\frac{4}{3}\pi\ (radius)^3$

Length

1 foot = 12 inches

1 yard = 3 feet

1 mile = 5,280 feet

1 meter = 1,000 millimeters

1 meter = 100 centimeters

1 kilometer = 1,000 meters

1 mile ≈ 1.6 kilometers

1 inch = 2.54 centimeters

1 foot ≈ 0.3 meter

Capacity / Volume

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

1 liter = 1,000 milliliters

1 liter ≈ 0.265 gallon

Weight

1 pound = 16 ounces

1 ton = 2,000 pounds

1 gram = 1,000 milligrams

1 kilogram = 1,000 grams

1 kilogram ≈ 2.2 pounds

1 ounce ≈ 28.3 grams

Mathematics

Directions

Time – 45 minutes

25 Questions

This is a test of your skills in applying mathematical concepts and solving mathematical problems. Read each question carefully and decide which of the five options best answers the question. Then mark your choice on your answer sheet.

There are relatively easy problems scattered throughout the test. Thus, do not waste time on problems that are too difficult; go on, and return to them if you have time.

Work as quickly as you can without becoming careless. Try to answer every question even if you have to guess.

Mark all your answers on the answer sheet. Give only one answer to each question.

If you decide to change one of your answers, be sure to erase the first mark completely.

Be sure that the number of the question you are answering matches the number of the row of answer choices you are marking on your answer sheet. The answer sheet may contain more rows than you need.

1 _____

Which of these is an irrational number?

A. $\sqrt{16/25}$
B. $\sqrt{17}$
C. $\sqrt{64}$
D. $\sqrt{169}$
E. $\sqrt{196}$

2 _____

Which of the following expressions is equivalent to $\sqrt[3]{343x^9y^7}$?

A. $7x^3y^{\frac{7}{3}}$
B. $7x^3y^2$
C. $7x^6y^4$
D. $7\sqrt{7}x^6y^4$
E. $7\sqrt{7}x^3y^{\frac{7}{3}}$

3 _____

What is the scientific notation of the number 5,700,000,000?

A. 5.7×10^8
B. 5.7×10^9
C. 57×10^{10}
D. 0.57×10^9
E. 0.57×10^{10}

4 _____

Oliver measures his sister's height as 57.3 inches using a measuring tape, marked with 5 divisions per inch. Given the level of accuracy of the measuring tape, which of the following could be Oliver's sister's actual height?

A. 57.03 in.
B. 57.23 in.
C. 57.32 in.
D. 57.003 in.
E. 57.031 in.

5 _____

Which of these numbers is closest to the value of the expression $\frac{1}{6} + \frac{2}{5}$?

A. $\frac{2}{5}$
B. $\frac{3}{7}$
C. $\frac{3}{5}$
D. $\frac{5}{8}$
E. $\frac{2}{3}$

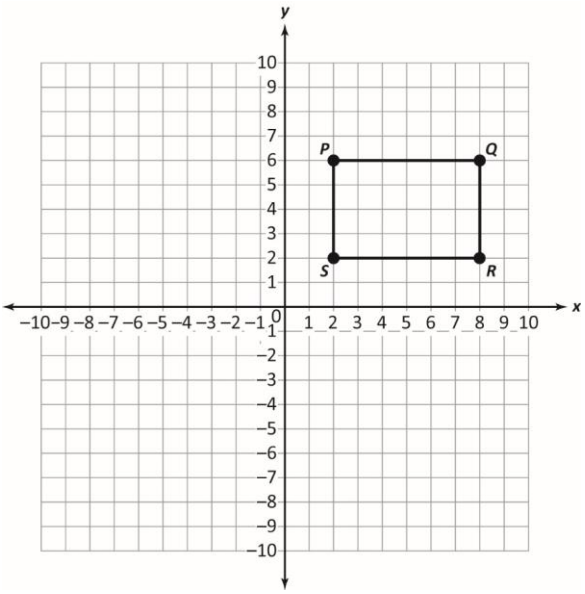
6 _____

The coordinates of a triangle PQR are $P(1, 2)$, $Q(3, 3)$, and $R(2, 4)$. If triangle PQR is translated 2 units to the right and 1 unit down and then reflected across the x-axis to obtain triangle XYZ, what are the coordinates of the vertices of triangle XYZ?

A. $X(1, 3), Y(2, 5), \text{and } Z(3, 4)$
B. $X(3, 1), Y(5, 2), \text{and } Z(4, 3)$
C. $X(3, -1), Y(5, -2), \text{and } Z(4, -3)$
D. $X(-3, 1), Y(-5, 2), \text{and } Z(-4, 3)$
E. $X(-1, -3), Y(-2, -5), \text{and } Z(-3, -4)$

7 _____

The rectangle *PQRS is as shown:*



What is the length of the diagonal PR of the rectangle?

A. $\sqrt{20}$ units
B. 52 units
C. 20 units
D. $\sqrt{52}$ units
E. 10 units

8 _____

A tin container has a density of 7.2 grams per cubic centimeter and a volume of 180 cubic centimeters. What is the mass of the container in kilograms?

A. 0.025
B. 0.040
C. 1.296
D. 25
E. 1296

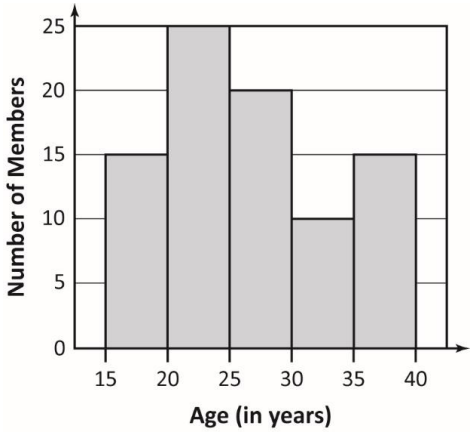
9 _____

A cylindrical water storage container has a base radius of 0.5 m and a height of 1.4 m. If $1 \text{ cubic meter} = 1{,}000 \text{ liters}$, how many liters of water can the container store? Use $\pi = \frac{22}{7}$.

A. 1.1 liters
B. 2.2 liters
C. 110 liters
D. 220 liters
E. 1,100 liters

10 _____

The histogram shows the age groups of students at a local dance academy.

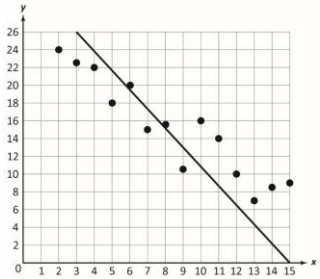


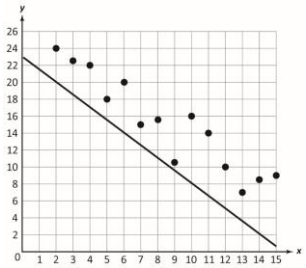
Which statement is true about the students?

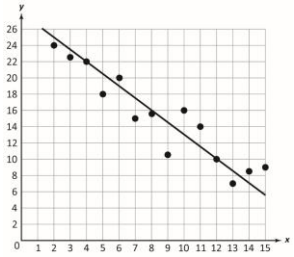
A. All the students are above 20 years.
B. All the students are below 35 years.
C. There are 25 students below 30 years.
D. There are 60 students below 30 years.
E. Most students are of the age group 30-35 years.

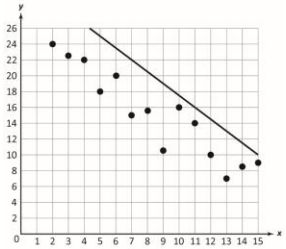
11 _____

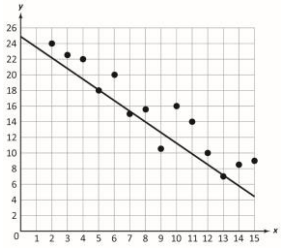
Which line would best fit the data shown in the scatter plot?

A. 

B. 

C. 

D. 

E. 

12 _____

Sophia is playing a game in which she rolls a number cube numbered from 1 to 6 and flips a coin. What is the probability that the cube will land on 5 and the coin will land on tails?

A. $\frac{1}{12}$

B. $\frac{1}{6}$

C. $\frac{5}{12}$

D. $\frac{1}{2}$

E. $\frac{2}{3}$

13 _____

There are four contenders for student council president. The table shows the number of votes each candidate received.

	Jorge	Omar	Scarlett	Grace	Total
Boys	65	85	70	60	280
Girls	45	50	90	35	220
Total	110	135	160	95	500

Based on the table, which statement is true?

A. A higher percentage of the girls' votes were for Omar.
B. A higher percentage of the boys' votes were for Grace.
C. A higher percentage of the girls' votes were for Jorge.
D. A higher percentage of the boys' votes were for Jorge.
E. A higher percentage of the girls' votes were for Scarlett.

14 _____

What is the solution to $5x^2 - 2x + 5 = 0$?

A. $x = \frac{1 \pm 2i\sqrt{6}}{5}$
B. $x = \frac{-2 \pm 2i\sqrt{6}}{10}$
C. $x = \frac{2 \pm 2i\sqrt{6}}{5}$
D. $x = \frac{1 \pm 2i\sqrt{6}}{10}$
E. $x = \frac{1 \pm 2\sqrt{6}}{5}$

15 _____

What is the solution of the equation $\sqrt{3x + 46} = x + 2$?

A. $\{-7\}$
B. $\{6\}$
C. $\{-6, 7\}$
D. $\{-6, -7\}$
E. $\{-7, 6\}$

16 _____

Consider the system of equations:

$2x - 5y = 15$

$3x - 7y = 23$

What values of x and y represent the solution of the given system of equations?

A. $x = 1$ and $y = 10$
B. $x = \frac{25}{2}$ and $y = 2$
C. $x = 10$ and $y = 1$
D. $x = 5$ and $y = 1$
E. $x = \frac{35}{4}$ and $y = \frac{1}{2}$

17 _____

The total surface area S of a right circular cone with radius r and slant height l is given by the equation $S = \pi r(r + l)$.

Which of the following equations correctly represents the slant height of the cone?

A. $l = S - \pi r^2$
B. $l = S - \pi r$
C. $l = \frac{S + \pi r^2}{\pi r}$
D. $l = \frac{S - \pi r^2}{\pi r}$
E. $l = \frac{\pi r^2 - S}{\pi r}$

18 _____

Oliver runs an apparel store. He employs three people and spends $210 each day on their wages, in addition to $40 on other daily expenses. The plastic bags they use cost $0.05 each, and the number of bags used in a day is x. He models this situation using the equation $250 + 0.05x$. What does $0.05x$ represent?

A. Other daily expenses
B. Fixed daily expenses
C. Salary of each employee
D. Salary of the sales people
E. Cost of plastic bags used in a day

19 _____

What is the product of the polynomials $-3x^2 + 5$ and $x^3 + 3x^2 - x - 7$?

A. $-3x^5 - 9x^4 + 8x^3 + 6x^2 - 5x + 35$
B. $-3x^5 - 9x^4 + 2x^3 + 36x^2 - 5x - 35$
C. $-3x^5 - 9x^4 + 8x^3 + 6x^2 - 5x - 35$
D. $-3x^5 - 9x^4 + 8x^3 + 36x^2 - 5x - 35$
E. $-3x^5 - 9x^4 + 2x^3 + 36x^2 - 5x + 35$

20 _____

Which factorization can be used to reveal the zeros of the function $f(x) = 2x^2 - 3x - 2$?

A. $f(x) = (x + 2)(2x + 1)$
B. $f(x) = (x - 2)(2x + 1)$
C. $f(x) = (x - 2)(2x - 1)$
D. $f(x) = (2x + 2)(x + 1)$
E. $f(x) = (2x - 2)(x - 1)$

21 _____

What is the solution of the linear equation $-5(3 - 7x) = 9x + 11$?

A. 1
B. $\frac{13}{22}$
C. $\frac{1}{11}$
D. $-\frac{2}{13}$
E. $-\frac{13}{22}$

22 _____

The present value of a car is $37,000. Its value depreciates by 15% every year. A person incorrectly wrote the inequality $37{,}000(0.15)^n < 25{,}000$ to find the number of years n after which the value of the car will be less than $25,000. What change should be made to the inequality to correct it?

A. Replace 0.15 with 15.
B. Replace 0.15 with 0.85.
C. Replace $<$ with $>$.
D. Replace $(0.15)^n$ with $(0.15)n$.
E. Interchange $37{,}000$ and $25{,}000$.

23 _____

Which table presents a function?

A.

x	1	3	1	-1
f(x)	2	4	3	0

B.

x	0	2	5	-3
f(x)	1	4	6	-7

C.

x	3	5	3	8
f(x)	-1	-1	-2	-1

D.

x	6	-2	6	-2
f(x)	12	-4	16	-8

E.

x	1	0	1	-4
f(x)	9	11	12	17

24 _____

Given $f(x) = 2x^2 - 3$, which statement is true about the average rate of change of the function?

A. The average rate of change of the function over the interval $[0, 2]$ is 1.
B. The average rate of change of the function over the interval $[0, 1]$ is -4.
C. The average rate of change of the function over the interval $[1, 2]$ is 6.
D. The average rate of change of the function over the interval $[2, 3]$ is 20.
E. The average rate of change of the function over the interval $[3, 4]$ is 17.

25 _____

A store is offering a discount of $5 on a minimum purchase of $25. A customer purchases x identical coffee mugs worth $9 each. The customer writes the equation $y = 9x - 25$ to find the net amount y in $ to be paid by him.

Which of these statements is true?

A. The equation is incorrect because 25 should be replaced by 5.
B. The equation is incorrect because – should be replaced by +.
C. The equation is incorrect because $9x$ and 25 should be interchanged.
D. The equation is correct because the discount used by the customer on his purchase is $25.
E. The equation is correct because $9x$ represents the number of coffee mugs purchased by the customer.

HiSET Answer Key and Rationales

Sequence Number	Correct Response	Content Category	Question Difficulty
1	B	I Numbers and Operations on Numbers	Easy
Rationale			
Option B is correct because $\sqrt{17}$ cannot be expressed in the form $\frac{p}{q}$ for some integers p and q with $q \neq 0$. So, it is an irrational number. $\sqrt{17}$ is a non-repeating, non-terminating decimal.			

Sequence Number	Correct Response	Content Category	Question Difficulty
2	A	I Numbers and Operations on Numbers	Medium
Rationale			
Option A is correct because $\sqrt[3]{343x^9y^7} = (343x^9y^7)^{\frac{1}{3}} = 7x^3y^{\frac{7}{3}}$.			

Sequence Number	Correct Response	Content Category	Question Difficulty
3	B	I Numbers and Operations on Numbers	Easy
Rationale			
Option B is correct because $5{,}700{,}000{,}000 = 57 \times 10^8 = \frac{57}{10} \times 10^8 \times 10 = 5.7 \times 10^9$.			

Sequence Number	Correct Response	Content Category	Question Difficulty
4	C	I Numbers and Operations on Numbers	Medium
Rationale			
Option C is correct because Oliver measures his sister's height as 57.3 inches using a measuring tape, marked with 5 divisions per inch. So, his sister's approximate height is 57.3 inches. Therefore, 57.32 inches could be his sister's actual height.			

Sequence Number	Correct Response	Content Category	Question Difficulty
5	C	I Numbers and Operations on Numbers	Easy
Rationale			
Option C is correct because $\frac{1}{6}+\frac{2}{5}=\frac{5+12}{30}=\frac{17}{30}\approx 0.5667$. Out of the given fractions, 0.5667 is closest to $\frac{3}{5}$.			

Sequence Number	Correct Response	Content Category	Question Difficulty
6	C	II Measurement / Geometry	Medium
Rationale			
Option C is correct because a translation of 2 units to the right and 1 unit down of triangle PQR will result in a triangle with vertices $(1+2, 2-1), (3+2, 3-1)$, and $(2+2, 4-1)$, which are $(3, 1), (5, 2)$, and $(4, 3)$. Then, reflecting the resulting triangle across the x-axis will result in triangle XYZ with coordinates $X(3, -1), Y(5, -2)$, and $Z(4, -3)$.			

Sequence Number	Correct Response	Content Category	Question Difficulty
7	D	II Measurement / Geometry	Medium
Rationale			
Option D is correct because there are 4 vertical units between P and R and 6 horizontal units between P and R. Therefore, the distance between P and R is calculated using the Pythagorean Theorem, $(PR)^2 = 4^2 + 6^2$. Solving for $PR = \sqrt{4^2 + 6^2} = \sqrt{52}$ units.			

Sequence Number	Correct Response	Content Category	Question Difficulty
8	C	II Measurement / Geometry	Medium
Rationale			
Option C is correct because $\text{density} = \frac{\text{mass}}{\text{volume}}$. $7.2 = \frac{\text{mass}}{180}$ $7.2(180) = \text{mass}$			

$1{,}296\text{ g} = \text{mass}$ $1{,}296\text{ g} \div 1{,}000\text{ g} = 1.296\text{ kg}$ $\text{mass} = 1296\text{ g or } 1.296\text{ kg}$

Sequence Number	Correct Response	Content Category	Question Difficulty
9	E	II Measurement / Geometry	Medium
Rationale			
Option E is correct because the volume of the container = $\pi r^2 h = \frac{22}{7} \times (0.5)^2 \times 1.4 = 1.1\text{ m}^3$. $1\text{ m}^3 = 1{,}000\ L$ $1.1\text{ m}^3 = 1{,}100\text{ liters}$			

Sequence Number	Correct Response	Content Category	Question Difficulty
10	D	III Data Analysis / Probability / Statistics	Medium
Rationale			
Option D is correct because the number of students below 30 years equals the sum of the number of students in the age groups 15-20, 20-25, and 25-30, which is 15 + 25 +20 = 60.			

Sequence Number	Correct Response	Content Category	Question Difficulty
11	C	III Data Analysis / Probability / Statistics	Easy
Rationale			
Option C is correct because its graph has the same number of points on, above, and below the line.			

Sequence Number	Correct Response	Content Category	Question Difficulty
12	A	III Data Analysis / Probability / Statistics	Easy
Rationale			
Option A is correct. Since there are two events, the probability that the cube will land on 5 must be multiplied by the probability that the coin will land on tails, $\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$.			

Sequence Number	Correct Response	Content Category	Question Difficulty
13	E	III Data Analysis / Probability / Statistics	Medium
Rationale			
Option E is correct because the total number of girls who voted for Scarlett is greater than the total number of girls who voted for any other candidate. So, the percentage of girls who voted for Scarlett at 90/220 = 40.9% will be higher when compared to the other options.			

Sequence Number	Correct Response	Content Category	Question Difficulty
14	A	III Data Analysis / Probability / Statistics	Hard
Rationale			
Option A is correct because $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(5)(5)}}{2(5)}$ $x = \frac{2 \pm \sqrt{4 - 100}}{10}$ $x = \frac{2 \pm \sqrt{-96}}{10}$ $x = \frac{2 \pm 4i\sqrt{6}}{10}$ $x = \frac{1 \pm 2i\sqrt{6}}{5}$			

Sequence Number	Correct Response	Content Category	Question Difficulty
15	B	IV Algebraic Concepts	Medium
Rationale			
Option B is correct because $\sqrt{3x + 46} = x + 2$ $3x + 46 = (x + 2)^2$ [By squaring on both sides] $3x + 46 = x^2 + 4x + 4$ $x^2 + x - 42 = 0$ $(x + 7)(x - 6) = 0$ $x = -7$ and $x = 6$			

Substituting $x = -7$ in the given equation: $\sqrt{3x + 46} = x + 2$ or $5 \neq -5$

So $x = -7$ is the extraneous solution of the equation.

Substituting $x = 6$ in the given equation: $\sqrt{3x + 46} = x + 2$ or $8 = 8$

So, $\{6\}$ is the solution set.

Sequence Number	Correct Response	Content Category	Question Difficulty
16	C	IV Algebraic Concepts	Medium

Rationale

Option C is correct because we solve the system of equations as shown:

$2x - 5y = 15$

$3x - 7y = 23$

From $2x - 5y = 15$, we get $x = \frac{1}{2}(15 + 5y)$

By substituting $x = \frac{1}{2}(15 + 5y)$ in $3x - 7y = 23$, we get

$3\left(\frac{1}{2}(15 + 5y)\right) - 7y = 23$

$\frac{45}{2} + \frac{15}{2}y - 7y = 23$

$\frac{1}{2}y = \frac{1}{2}$

$y = 1$

Substituting $y = 1$ in $x = \frac{1}{2}(15 + 5y)$ we get $x = 10$

So, $x = 10$ and $y = 1$ represent the solution of the given system of equations.

Sequence Number	Correct Response	Content Category	Question Difficulty
17	D	IV Algebraic Concepts	Hard

Rationale

Option D is correct because

$S = \pi r(r + l)$

$S = \pi r^2 + \pi rl$

$\pi rl = S - \pi r^2$

$l = \frac{S - \pi r^2}{\pi r}$

Sequence Number	Correct Response	Content Category	Question Difficulty
18	E	IV Algebraic Concepts	Hard

Rationale

Option E is correct because

Cost of one plastic bag = $\$0.05$

Number of plastic bags used in a day = x

Cost of x plastic bags = $\$0.05x$

Therefore, $0.05x$ represents the cost of plastic bags used in a day.

Sequence Number	Correct Response	Content Category	Question Difficulty
19	D	IV Algebraic Concepts	Medium

Rationale

Option D is correct because the product of the polynomials $-3x^2 + 5$ and $x^3 + 3x^2 - x - 7$

$= -3x^5 - 9x^4 + 3x^3 + 21x^2 + 5x^3 + 15x^2 - 5x - 35$

$= -3x^5 - 9x^4 + 8x^3 + 36x^2 - 5x - 35$

Sequence Number	Correct Response	Content Category	Question Difficulty
20	B	IV Algebraic Concepts	Medium

Rationale

Option B is correct because

$f(x) = 2x^2 - 3x - 2$

$f(x) = 2x^2 - 4x + x - 2$

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

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

So, $f(x) = (x - 2)(2x + 1)$ can be used to reveal the zeros of the function $f(x) = 2x^2 - 3x - 2$.

Sequence Number	Correct Response	Content Category	Question Difficulty
21	A	IV Algebraic Concepts	Medium
Rationale			
Option A is correct because $-5(3-7x)=9x+11$ $-15+35x=9x+11$ $-15+35x-9x=11$ $-15+26x=11$ $26x=11+15$ $26x=26$ $x=1$			

Sequence Number	Correct Response	Content Category	Question Difficulty
22	B	IV Algebraic Concepts	Hard
Rationale			
Option B is correct because the inequality must be $37{,}000(1-0.15)^n < 25{,}000$, $37{,}000(0.85)^n < 25{,}000$.			

Sequence Number	Correct Response	Content Category	Question Difficulty
23	B	IV Algebraic Concepts	Easy
Rationale			
Option B is correct because the function $f(x)$ assigns exactly one element to each element of x.			

Sequence Number	Correct Response	Content Category	Question Difficulty

24	C	IV Algebraic Concepts	Medium
Rationale			
Option C is correct because average rate of change of the function over the interval [1, 2] is $\frac{f(2)-f(1)}{2-1} = \frac{5-(-1)}{1} = \frac{6}{1} = 6$.			

Sequence Number	Correct Response	Content Category	Question Difficulty
25	A	IV Algebraic Concepts	Medium
Rationale			
Option A is correct because it is given that the customer purchased x identical coffee mugs worth $\$9$ each. Cost of x coffee mugs $= \$9x$ Discount used by the customer $= \$5$ Net amount paid by the customer, $\$y = 9x - 5$. Therefore, the equation written by the customer is incorrect and to correct it 25 should be replaced with 5.			