



Mathematics

Free Half-Length Practice Test – FPT9



Language
English

Released
2025

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Formula Sheet

Perimeter / Circumference

Rectangle

$$\text{Perimeter} = 2(\text{length}) + 2(\text{width})$$

Circle

$$\text{Circumference} = 2\pi(\text{radius})$$

Area

Circle

$$\text{Area} = \pi(\text{radius})^2$$

Triangle

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

Parallelogram

$$\text{Area} = (\text{base})(\text{height})$$

Trapezoid

$$\text{Area} = \frac{1}{2}(\text{base}_1 + \text{base}_2)(\text{height})$$

Volume

Prism/Cylinder

$$\text{Volume} = (\text{area of the base})(\text{height})$$

Pyramid/Cone

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

Sphere

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

Length

$$1 \text{ foot} = 12 \text{ inches}$$

$$1 \text{ yard} = 3 \text{ feet}$$

$$1 \text{ mile} = 5,280 \text{ feet}$$

$$1 \text{ meter} = 1,000 \text{ millimeters}$$

$$1 \text{ meter} = 100 \text{ centimeters}$$

$$1 \text{ kilometer} = 1,000 \text{ meters}$$

$$1 \text{ mile} \approx 1.6 \text{ kilometers}$$

$$1 \text{ inch} = 2.54 \text{ centimeters}$$

$$1 \text{ foot} \approx 0.3 \text{ meter}$$

Capacity / Volume

$$1 \text{ cup} = 8 \text{ fluid ounces}$$

$$1 \text{ pint} = 2 \text{ cups}$$

$$1 \text{ quart} = 2 \text{ pints}$$

$$1 \text{ gallon} = 4 \text{ quarts}$$

$$1 \text{ liter} = 1,000 \text{ milliliters}$$

$$1 \text{ liter} \approx 0.265 \text{ gallon}$$

Weight

$$1 \text{ pound} = 16 \text{ ounces}$$

$$1 \text{ ton} = 2,000 \text{ pounds}$$

$$1 \text{ gram} = 1,000 \text{ milligrams}$$

$$1 \text{ kilogram} = 1,000 \text{ grams}$$

$$1 \text{ kilogram} \approx 2.2 \text{ pounds}$$

$$1 \text{ ounce} \approx 28.3 \text{ grams}$$

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 _____

Pam bought a refrigerator for \$1,200. She made a \$200 down payment. The rest of the purchase price was split evenly into four payments.

What was the amount of each payment?

- A. \$100
- B. \$250
- C. \$300
- D. \$350
- E. \$500

2 _____

The circumference of a circle is 196π millimeters.

What is the radius, in millimeters, of the circle?

- A. 7
- B. 14
- C. 28
- D. 98
- E. 196

3 _____

A librarian needs to determine activities that would increase interest at the library among members in the community. The librarian will survey people about their interests.

Which survey method would most likely produce the most reliable results?

- A. Survey every 10th person who visits the library on a Monday.
- B. Survey every 10th female who visits the library for one week.
- C. Survey every 10th male who visits the grocery store closest to the library on a Tuesday.
- D. Survey every 10th person who visits the grocery store closest to the library on a Wednesday.
- E. Survey every 10th person who visits the grocery store closest to the library each day of the week.

4 _____

Which of the following expressions is equivalent to $(4x^3)(5x^2)$?

- A. $9x^5$
- B. $9x^6$
- C. $20x^5$
- D. $20x^6$
- E. $20x^9$

5 _____

Students at a school have two types of calculators that use batteries of the same size. The type F calculator uses 4 batteries and type G calculator uses 1 battery. There are 650 new batteries available.

Which inequality can be used to determine f , the number of type F calculators, and g , the number of type G calculators, that can receive all new batteries?

- A. $650 \leq 4f + 1g$
- B. $650 \leq 1f + 4g$
- C. $650 \geq 4f + 1g$
- D. $650 \geq 5(f + g)$
- E. $650 \leq 5(f + g)$

6 _____

At a restaurant, the cost to produce cheese pizzas in the shape of circles is the same per square inch for all sizes of pizza. The cost to produce a cheese pizza is approximately \$0.009 per square inch.

Which is the closest to the cost to produce a cheese pizza with a radius of 4 inches?

- A. \$0.11
- B. \$0.22
- C. \$0.45
- D. \$0.90
- E. \$1.80

7 _____

A swimming pool with the volume of 4,096 cubic feet is in the shape of a cube.

What is the length of one side of the pool in feet?

- A. 8 feet
- B. 16 feet
- C. $13\sqrt{6}$ feet
- D. 32 feet
- E. $26\sqrt{6}$ feet

8 _____

A student rewrites the quadratic equation $y^2 - 8y = 7$ in the form of $(y - m)^2 = n$, where m and n are constants.

What is the value of n ?

- A. -9
- B. -23
- C. 7
- D. 16
- E. 23

9 _____

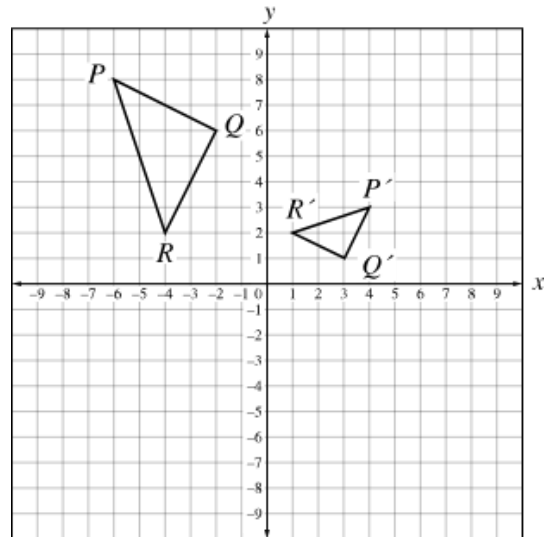
Light travels at a speed of 3×10^8 meters per second. There are approximately 3.16×10^7 seconds in 1 year.

Which is the closest to the distance, in meters, light travels in 1 year?

- A. 1.05×10^1
- B. 9.48×10^8
- C. 1.05×10^{15}
- D. 9.48×10^{15}
- E. 9.48×10^{56}

10 _____

Triangle PQR is similar to triangle $P'Q'R'$ on the following coordinate grid.



Which sequence of transformations can be applied to triangle PQR to create triangle $P'Q'R'$?

- A. A reflection across the y -axis and a dilation of $\frac{1}{2}$ using the origin as the center of the dilation
- B. A dilation of $\frac{1}{2}$ using the origin as the center of dilation and a translation 5 units to the right
- C. A 90° clockwise rotation about the origin and a dilation of $\frac{1}{2}$ using the origin as the center of dilation
- D. A 90° clockwise rotation about the origin and a dilation of 2 using the origin as the center of dilation
- E. A 90° counterclockwise rotation about the origin and a dilation of 2 using the origin as the center of dilation

11 _____

The table below records the relative frequencies of responses to a survey in which each respondent chose one of three favorite fruits.

	Peach	Apple	Watermelon	Total
Male	0.08	0.42	0.12	0.62
Female	0.16	0.14	0.08	0.38
Total	0.24	0.56	0.20	1.00

There was a total of 20 female respondents who chose peaches.

What was the total number of respondents, both male and female, to the survey?

- A. 125
- B. 188
- C. 297
- D. 320
- E. 329

12 _____

Wayne is going to buy the same number of drinks as hot dogs. Drinks cost \$2 each, and hot dogs cost \$3 each. Wayne has \$36 to buy the drinks and hot dogs.

Which inequality could be used to determine the maximum number of drinks and hot dogs Wayne could buy?

- A. $(2x)(3x) \leq 36$
- B. $2(3)(x) \leq 36$
- C. $2x + 3x \leq 36$
- D. $2 + 3x \leq 36$
- E. $2x + 3 \leq 36$

13 _____

The table below shows the number of books of each category sold each day during a 2-day book fair.

Type of Book	Saturday	Sunday
Fiction	18	10
Adventure	16	14
Biography	12	10
Horror	8	12

What is the mean of the total number of adventure books and horror books sold during the two days?

- A. 10
- B. 12
- C. 15
- D. 25
- E. 50

14 _____

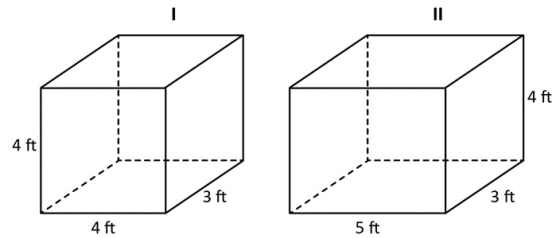
Missy has a box of marbles. She takes them out of the box and counts 4 red, 3 green, 5 orange, 2 yellow, and 6 purple marbles. She then puts the marbles back in the box.

Based on the data, what is the probability that the next marble Missy randomly selects will be purple?

- A. $\frac{1}{6}$
- B. $\frac{3}{10}$
- C. $\frac{7}{10}$
- D. $\frac{3}{5}$
- E. $\frac{10}{3}$

15 _____

Peter has two storage chests, I and II. He renovates all the surfaces of the storage chests using a decorative paper.



Which statement is true?

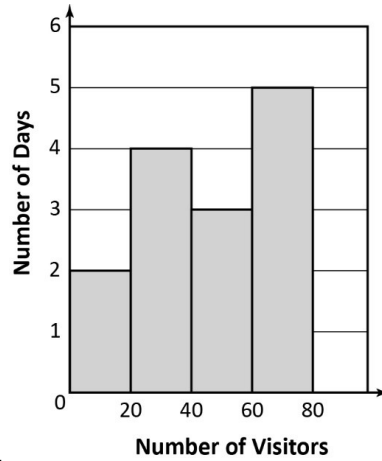
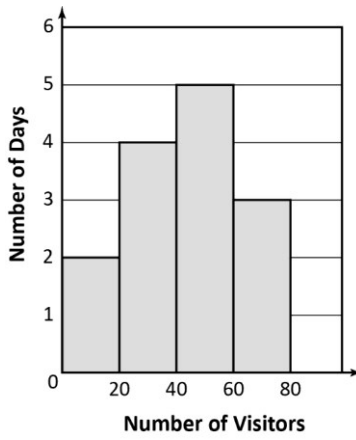
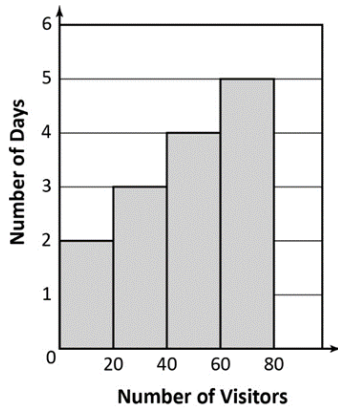
- A. Storage chest I needs 7 square feet more decorative paper than storage chest II.
- B. Storage chest II needs 7 square feet more decorative paper than storage chest I.
- C. Storage chest I needs 14 square feet more decorative paper than storage chest II.
- D. Storage chest II needs 14 square feet more decorative paper than storage chest I.
- E. Storage chest II needs 28 square feet more decorative paper than storage chest I.

16

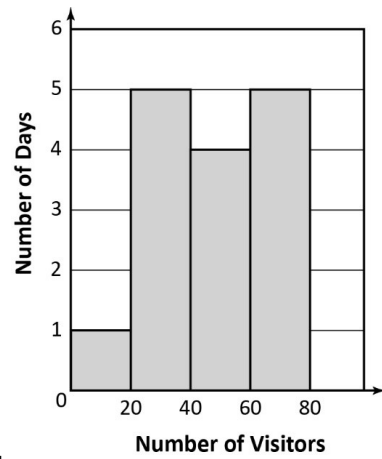
The following data points represent the number of visitors at a salon each day since it opened.

12, 19, 25, 33, 21, 52, 45, 77, 38, 49, 61, 68, 71, 62

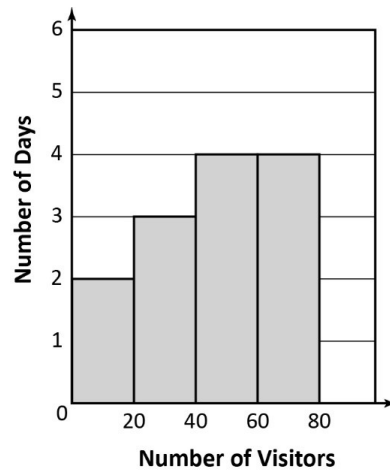
Which histogram correctly matches the given data?



C.



D.



E.

17 _____

Sophia started downloading a mobile application at 4:20 p.m. She observed that at 4:30 p.m., 40% had been downloaded.

If the downloading speed is constant, when will the application be completely downloaded?

- A. 3:55 p.m.
- B. 4:24 p.m.
- C. 4:45 p.m.
- D. 4:55 p.m.
- E. 5:00 p.m.

18 _____

In the expressions below, a and b represent positive integers.

Expression I: 3×10^a

Expression II: $9 \times 10^{a+b}$

The value of Expression II is 30,000 times greater than the value of Expression I.

What is the value of b ?

- A. 3
- B. 4
- C. 5
- D. -3
- E. -4

19 _____

Daniel is 18 years younger than his uncle. The sum of their ages is 62.

What is Daniel's age?

- A. 22
- B. 26
- C. 40
- D. 44
- E. 58

20 _____

Consider the function $f(x) = 4x^2 - 5\sqrt{2}x$.

What is the value of $f(8)$?

- A. $256 - 10\sqrt{2}$
- B. $256 - 20\sqrt{2}$
- C. 216
- D. 236
- E. 276

21 _____

What are the coordinates of the vertex of the parabola represented by the equation

$$y = 5x^2 + 40x - 60?$$

- A. $(8, -60)$
- B. $(6, 0)$
- C. $(4, 20)$
- D. $(2, 0)$
- E. $(-4, -140)$

22 _____

Sarah bakes cookies at her bakery. She has noticed that her average cost per cookie depends on the number of cookies she bakes. The cost of baking x cookies is given by the equation $C(x) = 20 + 0.1x$.

Which equation represents the average cost AC per cookie of baking x cookies?

- A. $AC(x) = \frac{20}{x} + 0.1$
- B. $AC(x) = \frac{20}{x} + 10$
- C. $AC(x) = \frac{20}{x} + 0.01$
- D. $AC(x) = 2x$
- E. $AC(x) = \frac{2}{x}$

23 _____

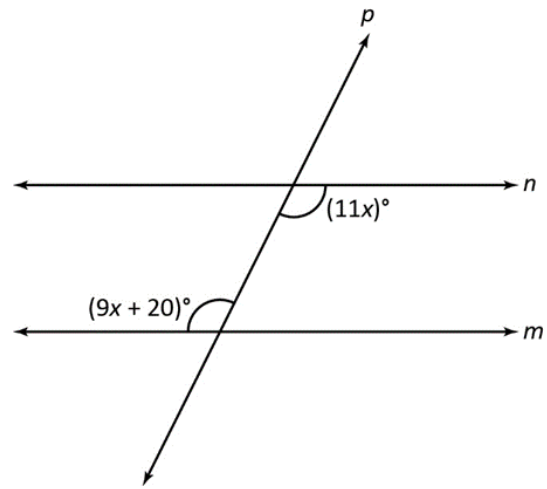
Consider the function $3.5x^2 - 28x + 11$.

What is the rate of change of the function over the interval $1 \leq x \leq 4$?

- A. -31.5
- B. -10.5
- C. -6.3
- D. 10.5
- E. 31.5

24 _____

Lines n and m are intersected by line p , as shown in the figure.



Which of these equations can be used to find the value of x ?

- A. $11x = 9x + 20$
- B. $11x + (9x + 20) = 90$
- C. $11x - (9x + 20) = 180$
- D. $11x + (9x + 20) = 180$
- E. $11x + (9x + 20) = 360$

25 _____

What is the solution of the system of equations shown below?

$$3x - 6y = 12$$

$$2x - 8y = 16$$

- A. $x = \frac{8}{3}, y = -\frac{2}{3}$
- B. $x = \frac{4}{3}, y = -\frac{4}{3}$
- C. $x = 0, y = -2$
- D. $x = -2, y = -3$
- E. $x = 2, y = -1$

HiSET Answer Key and Rationales

Sequence Number	Correct Response	Content Category	Question Difficulty
1	B	I. Numbers and Operations on Numbers	Easy
Rationale			
<p>Option B is correct because once the \$200 down payment is subtracted from the full amount (\$1,200), \$1,000 remains. \$1,000 split into four equal payments is \$250, since $\\$1,000 \div 4 = \\250.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
2	D	II. Measurement/Geometry	Medium
Rationale			
<p>Option D is correct because the formula for circumference = $2\pi(\text{radius})$, and the given circumference is 196π millimeters.</p> <p>$196\pi = 2\pi(\text{radius})$</p> <p>$196\pi \div 2\pi = \text{radius}$</p> <p>$196\pi \div 2\pi = 98 = \text{radius}$</p> <p>Therefore, the radius is 98 millimeters.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
3	E	III. Data Analysis/Probability/Statistics	Medium
Rationale			
<p>Option E is correct because the group being surveyed would not be limited by gender or day of the week, and represents the most representative sample of people in the community given the list of choices.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
4	C	I. Numbers and Operations on Numbers	Medium
Rationale			
<p>Option C is correct because using the distributive property, the expression becomes $(4 \times 5) \times (x^{(2+3)}) = 20x^5$.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
5	C	IV. Algebraic Concepts	Medium
Rationale			
<p>Option C is correct because f represents the number of calculators that require 4 batteries ($4f$), and g represents the number of calculators that require 1 battery ($1g$). The maximum number of batteries available is 650, so the inequality must represent the combination of f and g as equal to or less than 650.</p> <p>Therefore, $650 \geq 4f + 1g$.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
6	C	II. Measurement/Geometry	Medium
Rationale			
<p>Option C is correct because using the formula for Area = $\pi(\text{radius})^2$ and knowing the radius of the pizza is 4 inches, the cheese pizza will have an Area of $\pi(4)^2$ square inches.</p> <p>$\pi(4)^2 = 16\pi$</p> <p>$16\pi \approx 50.3$ square inches</p> <p>Then, multiply 50.27 by the cost to produce one square inch of cheese pizza, \$0.009.</p> <p>$50.3 \times \\$0.009 \approx \\$0.45$</p> <p>Thus, the cost to produce a cheese pizza with a 4-inch radius is approximately \$0.45.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
7	B	IV. Algebraic Concepts	Easy
Rationale			
<p>Option B is correct because the formula to find the volume of a cube is $V = a^3$, where a is the length of the cube's sides. The volume (V) of the swimming pool is 4,096 cubic feet</p> $4,096 = a^3$ $\sqrt[3]{4,096} = a$ $16 = a$ <p>So, the length of one side of the pool is 16 feet.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
8	E	IV. Algebraic Concepts	Hard
Rationale			
<p>Option E is correct because the equation $y^2 - 8y = 7$ can be solved by completing the square, as shown in the following steps:</p> $y^2 - 8y + \left(\frac{-8}{2}\right)^2 = 7 + \left(\frac{-8}{2}\right)^2$ $y^2 - 8y + (-4)^2 = 7 + (-4)^2$ $(y - 4)^2 = 23.$ <p>Then comparing $(y - 4)^2 = 23$ with $(y - m)^2 = n$, we get $n = 23$.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
9	D	I. Numbers and Operations on Numbers	Medium
Rationale			
<p>Option D is correct because you multiply the speed of light (3×10^8 meters per second) by the number of seconds in the year 3.16×10^7.</p> $(3 \times 10^8) \times (3.16 \times 10^7) = (3 \times 3.16) \times 10^{8+7} = 9.48 \times 10^{15}$			

Sequence Number	Correct Response	Content Category	Question Difficulty
10	C	II. Measurement/Geometry	Medium
Rationale			
<p>Option C is correct because a 90° clockwise rotation about the origin yields vertices of triangle PQR at $P(8, 6)$, $Q(6, 2)$, and $R(2, 4)$. The dilation of 2 to this triangle yields triangle $P'Q'R'$ at $P'(4, 3)$, $Q'(3, 1)$, and $R'(1, 2)$.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
11	A	III. Data Analysis/Probability/Statistics	Medium
Rationale			
<p>Option A is correct because 20 female respondents are equivalent to 16% of the respondents to the survey, as per the data table. Therefore, the total number of respondents is $20 \div 0.16$, which is 125 people.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
12	C	IV. Algebraic Concepts	Easy
Rationale			
<p>Option C is correct because if x represents both the number of drinks and hot dogs Wayne will buy, then $2x$ is the cost of the drinks and $3x$ is the cost of the hot dogs. So, $2x + 3x$ is the total cost of all the food and drinks Wayne buys. Since Wayne has at most \$36 to spend $2x + 3x$ must be less than or equal to \$36. Thus, $2x + 3x \leq 36$.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
13	D	III. Data Analysis/Probability/Statistics	Easy
Rationale			
<p>Option D is correct because the total number of adventure books and horror books sold is $(16 + 14) + (8 + 12) = 50$.</p>			

The mean of the total number of adventure books and horror books sold during the two days is $\frac{50}{2} = 25$.

Sequence Number	Correct Response	Content Category	Question Difficulty
14	B	III. Data Analysis/ Probability/Statistics	Easy

Rationale

Option B is correct because the total number of marbles Missy has randomly pulled out of the box so far is $4 + 3 + 5 + 2 + 6 = 20$. She has taken out 6 purple marbles.

Based on the data, the probability that the next marble Missy selects will be purple is $\frac{6}{20}$, which simplifies to $\frac{3}{10}$.

Sequence Number	Correct Response	Content Category	Question Difficulty
15	D	II. Measurement/Geometry	Medium

Rationale

Option D is correct because the total surface area, in square feet, of chest I = $2(4 \times 4 + 4 \times 3 + 3 \times 4) = 80$, and the total surface area, in square feet, of chest II = $2(5 \times 4 + 5 \times 3 + 3 \times 4) = 94$.

Total surface area of chest II – total surface area of chest I = $94 - 80 = 14$.

So, storage chest II needs 14 square feet more decorative paper than storage chest I.

Sequence Number	Correct Response	Content Category	Question Difficulty
16	C	III. Data Analysis/ Probability/Statistics	Easy

Rationale

Option C is correct because option C most accurately reflects the given data, which shows two (2) days of less than 20 visitors, four (4) days of between 20-40 visitors, three (3) days of between 40-60 visitors, and five (5) days of between 60 and 80 visitors.

Sequence Number	Correct Response	Content Category	Question Difficulty
17	C	I. Numbers and Operations on Numbers	Hard
Rationale			
<p>Option C is correct because 40% of the application had been downloaded in 10 minutes. Let x represent the time, in minutes, it takes to completely download the application.</p> <p>So, $\frac{40}{100} = \frac{10}{x}$. Solving $\frac{40}{100} = \frac{10}{x}$ for x, we get $x = 25$</p> <p>The mobile application will be completely downloaded at 4.45 p.m. since 4.20 p.m. + 25 minutes = 4.45 p.m..</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
18	B	I. Numbers and Operations on Numbers	Easy
Rationale			
<p>Option B is correct because</p> $3 \times 10^a \times 30,000 = 9 \times 10^{a+b}$ $3 \times 10^a \times 3 \times 10^4 = 9 \times 10^{a+b}$ $(3 \times 3) \times (10^a \times 10^4) = 9 \times 10^{a+b}$ $9 \times 10^{a+4} = 9 \times 10^{a+b}$ $a + 4 = a + b$ $4 = b.$			

Sequence Number	Correct Response	Content Category	Question Difficulty
19	A	IV. Algebraic Concepts	Easy
Rationale			
<p>Option A is correct because, if D represents Daniel's age and U represents his uncle's age, their age difference would be $U - D = 18$, and the sum of their ages would be $U + D = 62$.</p> <p>Rewrite $U - D = 18$ as $U = D + 18$, then substitute it for U in $U + D = 62$.</p>			

$$D + 18 + D = 62$$

$$2D + 18 = 62$$

$$2D = 44$$

$$D = 22$$

So, Daniel's age is 22 years.

Sequence Number	Correct Response	Content Category	Question Difficulty
20	D	IV. Algebraic Concepts	Easy
Rationale			
<p>Option D is correct because</p> $f(x) = 4x^2 - 5\sqrt{2x}$ and substituting 8 for x , $f(8) = 4(8)^2 - 5\sqrt{2(8)}$. Therefore, $f(8) = 4(64) - 5\sqrt{16}$ $f(8) = 256 - 20$ $f(8) = 236.$			

Sequence Number	Correct Response	Content Category	Question Difficulty
21	E	IV. Algebraic Concepts	Hard
Rationale			
<p>Option E is correct because, for a quadratic equation in standard form, the x-coordinate of the vertex is given by the formula $x = -b \div (2a)$, which would be</p> $x = -40 \div (2 \times 5) = -4.$ <p>Then, substituting -4 for x in the original equation of $y = 5x^2 + 40x - 60$,</p> $y = 5(-4)^2 + 40(-4) - 60$ $y = 80 - 160 - 60$ $y = -140.$ <p>Therefore, the coordinates are $(-4, -140)$.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
22	A	IV. Algebraic Concepts	Medium
Rationale			
<p>Option A is correct because to find the equation for the average cost per cookie of baking x cookies, we need to divide the total cost by the number of cookies. The total</p>			

cost is given by $C(x) = 20 + 0.1x$, and the number of cookies is x . Therefore, the average cost per cookie is

$$AC(x) = \frac{C(x)}{x}$$

$$AC(x) = \frac{20 + 0.1x}{x}$$

$$AC(x) = \frac{20}{x} + 0.1.$$

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

Rationale

Option B is correct because the rate of change of the function over the interval

$1 \leq x \leq 4$ is $\frac{f(4)-f(1)}{4-1}$. Substituting 4 for x and then 1 for x ,

$$f(4) = 3.5(4)^2 - 28(4) + 11 = -45$$

$$f(1) = 3.5(1)^2 - 28(1) + 11 = -13.5.$$

So, the rate of change is $\frac{-45-(-13.5)}{3} = -10.5$.

Sequence Number	Correct Response	Content Category	Question Difficulty
24	A	II. Measurement/Geometry	Easy

Rationale

Option A is correct because when a transversal line intersects two parallel lines, then the alternate interior angles formed are congruent, which means that the expressions are equal. Therefore, the equation $11x = 9x + 20$ can be used to find the value of x .

Sequence Number	Correct Response	Content Category	Question Difficulty
25	C	IV. Algebraic Concepts	Easy
Rationale			
<p>Option C is correct because the first equation in the given system of equations can be solved by</p> $3x - 6y = 12$ $3x = 12 + 6y$ $x = 4 + 2y.$ <p>Then, substituting this value of x in the second equation, we have</p> $2x - 8y = 16$ $2(4 + 2y) - 8y = 16$ $8 + 4y - 8y = 16$ $8 - 4y = 16$ $-4y = 8$ $y = (-2).$ <p>Now, substituting this value of y in the $x = 4 + 2y$ equation, we have</p> $x = 4 + 2(-2)$ $x = 0.$ <p>Therefore, $x = 0, y = -2$.</p>			