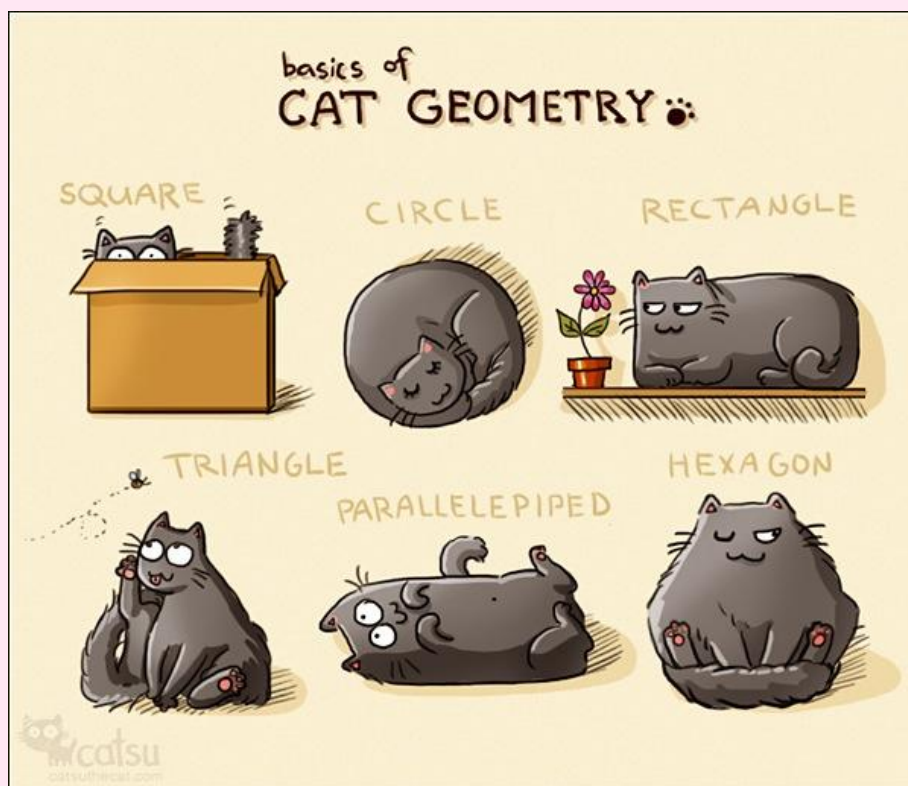*Motto:*

„Pure mathematics is, in its way, the poetry of logical ideas. ”
Albert Einstein

PARTEA a V-a

MATEMATICĂ ÎN LIMBA ENGLEZĂ

$$5a^2 + 15ab = 5a \cdot (a + 3b)$$

Din cuprins:

$$55695100000 = 5.56951 \times 10^{10}$$

V.1. TESTE DE MATEMATICĂ ÎN LIMBA ENGLEZĂ[2]

TEST NO. 1

Section A (45 marks) – Choice correct answers in Section A

1. Is 2 a prime number or a composite number?
a) prime number;
b) composite number.

2. What is the greatest common factor of 20 and 12?
a) 6
b) 2
c) 4

3. Look at the following expression: $x^3 - 9x$. How many terms are there?
a) 5
b) 9
c) 2
d) 1

4. Which sign makes the statement true?
- 2 **?** 0
a) >
b) <
c) =

5. Which set of numbers is ordered from **greatest** to least?

a) $-\dfrac{3}{6} > \dfrac{1}{2} > \dfrac{3}{15}$

b) $\dfrac{3}{15} > \dfrac{1}{2} > -\dfrac{3}{6}$

c) $\dfrac{1}{2} > \dfrac{3}{15} > -\dfrac{3}{6}$

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[2] Testele din cadrul acestui paragraf conţin probleme şi exerciţii adaptate de pe site-ul IXL *Math / Online math practice and lessons*, un site popular pentru profesori, familie şi elevi, de unde se poate însuşi vocabularul matematic în limba engleză, atât la geometrie, cât şi la algebră; este un site util şi celor care doresc să pregătească examene de admitere pentru diferite colegii din străinătate, el având o programă compatibilă cu cea americană şi cea britanică. Personal l-am utilizat în pregătirea pentru examenul de admitere la Fettes College din Edinburgh pe care l-am susţinut în data de 25.02.2013.

Ca şi o observaţie pentru cei ce doresc să rezolve problemele din acest paragraf/capitol, este că în matematica americană şi cea britanică, virgula "," se consideră punct "." şi, invers, punctul "."se consideră virgulă ",".

Fiecare test conţine 18 probleme notate cu câte 5 puncte şi 10 puncte din oficiu, deci un total maxim de acumulat de 100 de puncte, iar timpul de lucru este de 50 de minute.
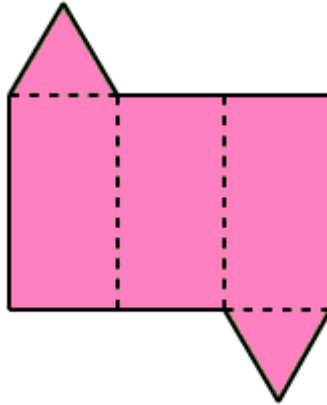
6. In which quadrant is (-5, 5)?

a) Quadrant I

b) Quadrant II

c) Quadrant III
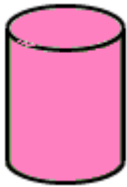
d) Quadrant IV

7. Which functions are linear? Select all that apply.

a) $u = v$

b) $u = -5v^2 + 5v + 2$

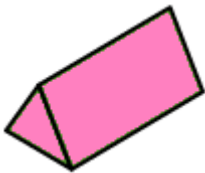**c)** $u = 5v + 10$

d) $u = v^3 + v$
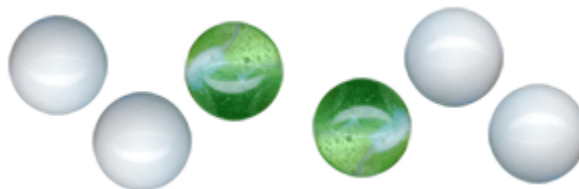
8. Which figure will this net make?

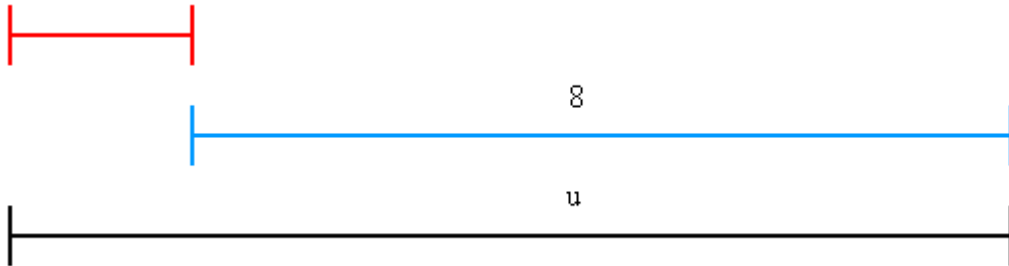**a)**

b)

9. You pick a marble at random.

What is probability P(green or white)? Simplify your answer and write it as a fraction or whole number.

a) 1

b) $\dfrac{1}{3}$

c) $\dfrac{2}{3}$

Section B (45 marks) – **Answer all questions in Section B**

1. Evaluate the expression $j - k$ for $j = -12$ and $k = -2$.

2. Write an expression that represents the length of the red line:

3. What is the opposite of -2?

4. A zoology magazine reported on the cost of admission to different zoos.
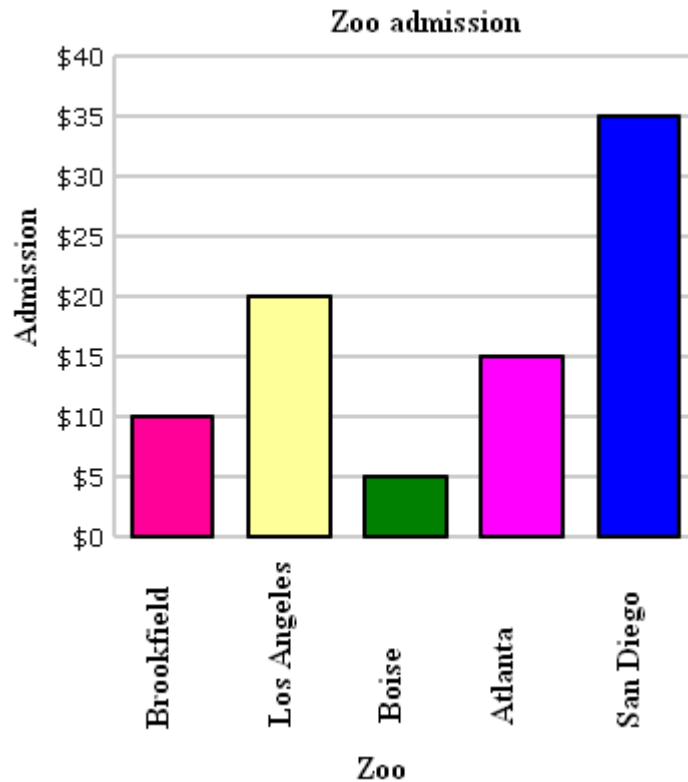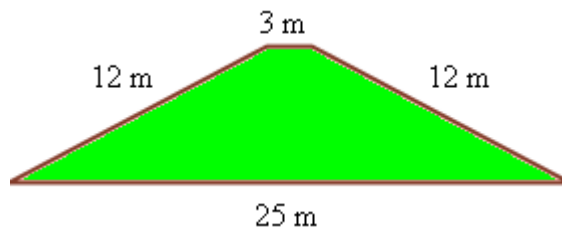

How much would it cost in all to visit the Los Angeles Zoo and the Atlanta Zoo?

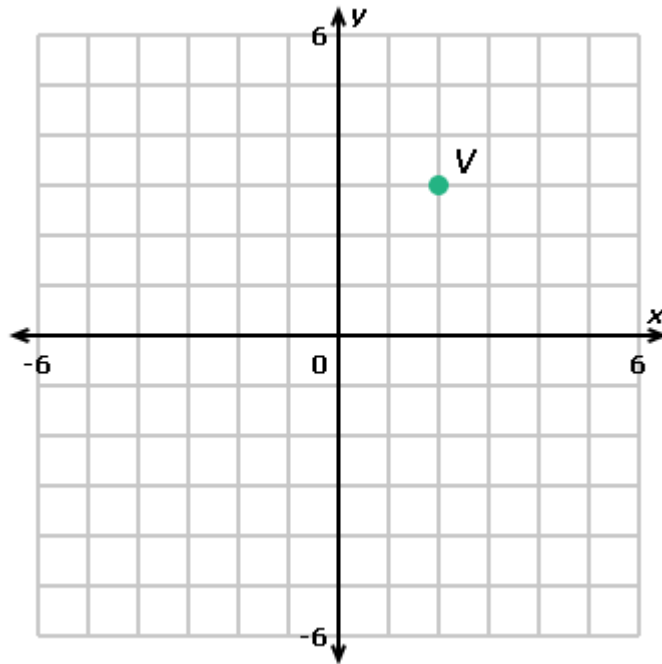**5.** In the data set below, what is the lower quartile?

22   28   28   60   63   66   78   83   84   86   97
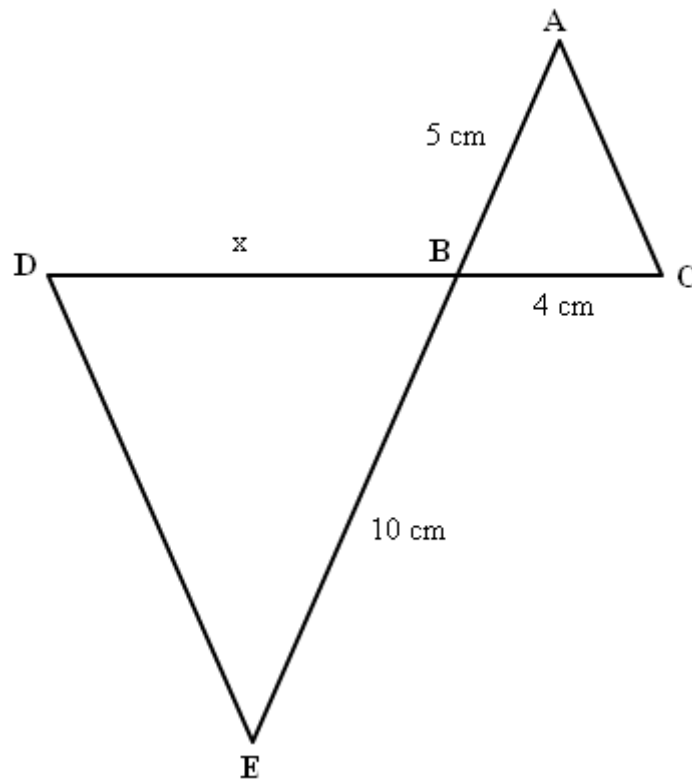
6. What is the perimeter?

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7. Shubha only has 5 pieces of Halloween candy left. In how many different orders can she eat the remaining candy?

8. The point $V(2, 3)$ is rotated 180° clockwise around the origin. What are the coordinates of the resulting point, V'?

9. In the diagram below, $\triangle BC \sim \triangle BDE$. Fiind x.

TEST NO. 2

Section A (45 marks) – Choice correct answers in Section A

1. Which of the following describe 10? Select all that apply.
a) natural number
b) integer
c) irrational number
d) real number

2. Use counters to add 2 + (-5).
You start with:

You add:

Which counters show the sum?

a)

b)

c)

d)

3. Sara has $89.00. Does she have enough to buy a ball signed by a famous football player and a book signed by a famous author?

ball signed by a famous football player	$50.00
skate signed by a famous figure skater	$66.00
book signed by a famous author	$64.00
photograph signed by a famous actor	$35.00

a) yes
b) no

4. Look at the following expression: $2 + 5m + m^3$. What is the coefficient of m^3 ?
a) m^3
b) 5m
c) 2
d) 1

5. Multiply: $(4 \times 10^3) \times (2 \times 10^2)$
a) 8×10^6
b) 8×10^5
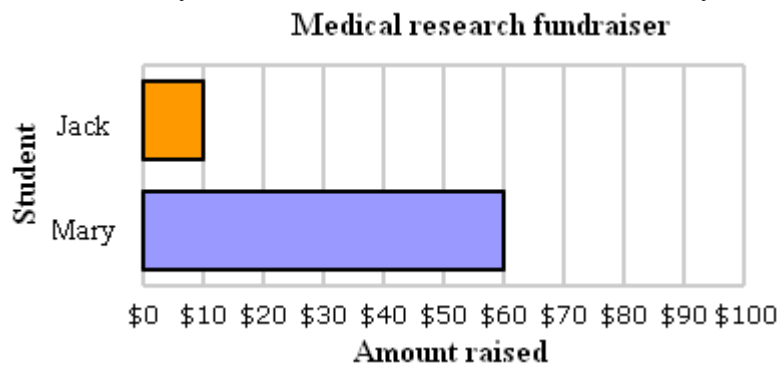**c)** 8×10^8

6. What is PQ?
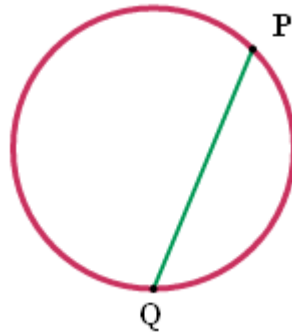
a) radius
b) chord
c) center

7. Are these ratios equivalent?
5 children for every 11 adults
8 children for every 24 adults
a) yes
b) no

8. Some students raised money for medical research. How much money raised each student?

Medical research fundraiser

a)

Medical research fundraiser	
Student	Amount raised
Jack	10
Mary	40

b)

Medical research fundraiser	
Student	Amount raised
Jack	10
Mary	60

9. Is $75 + (-80)$ positive or negative?
a) positive
b) negative

**Section B (45 marks) – Answer all questions in Section B**

1. How do you write 987,000 in scientific notation?

2. To figure out how many vacation days she had left to use, Theresa looked over her old calendars to figure out how many days of vacation she had taken each year.

Vacation days taken by Theresa	
Year	**Vacation days**
2009	13
2010	20
2011	18
2012	14
2013	15

According to the table, what was the rate of change between 2012 and 2013 [vacation days per year] ?

3. The students at Grant Middle School are raising money for stadium renovations.

Fundraising by grade
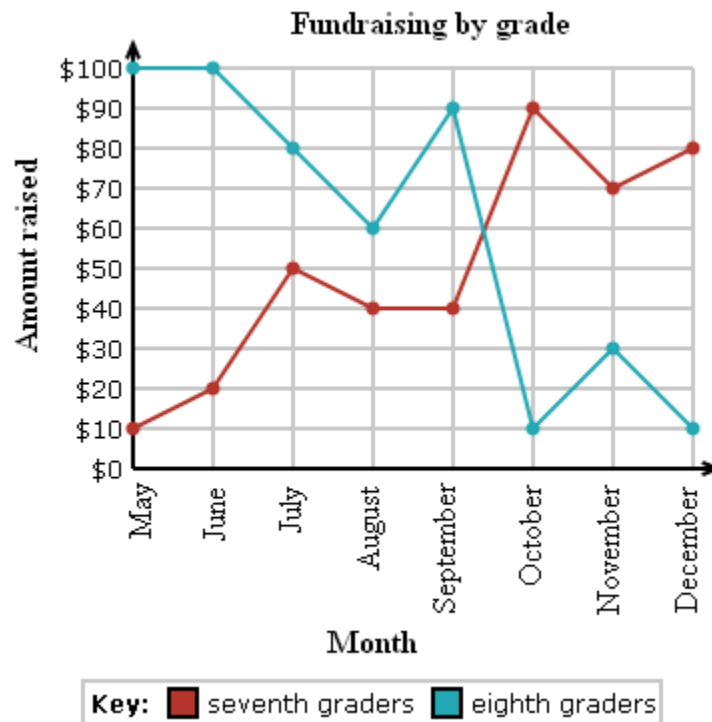
In July, how much more money did the eighth graders raise than the seventh graders?
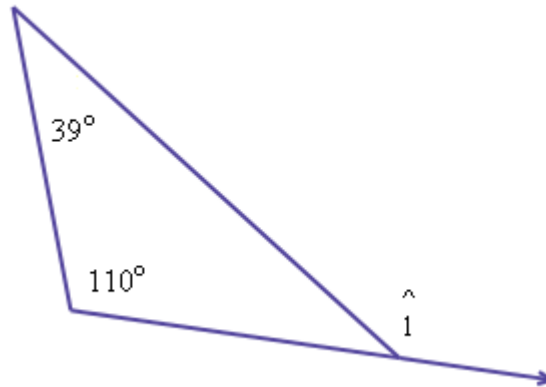
4. Type the missing number in this sequence:

6,   14,   22,   [,   ]   38,   46,   54,   [   ]

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5. What inequality does this number line show?

-7 -6 -5 -4 -3 -2 -1

Write your answer starting with x *(for example, x < 3).*

6. What is $m\left(\hat{1}\right)$?
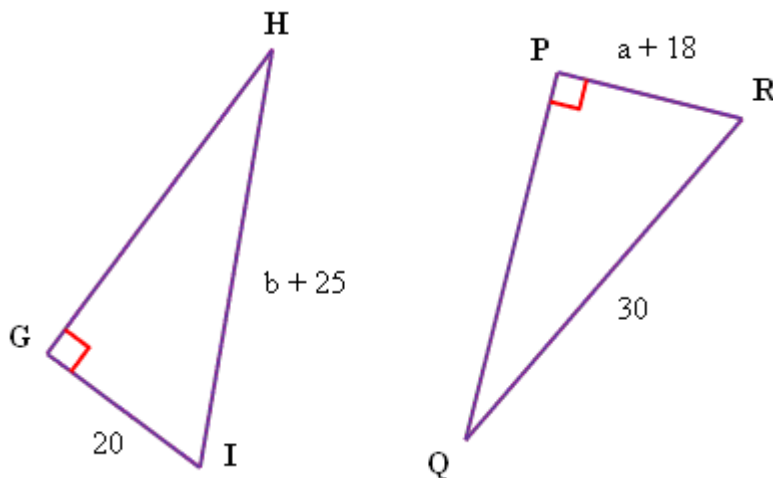

39°

110°

$\hat{1}$

7. Larant earned pocket money by recycling cans and bottles on 7 occasions. The redemption values were:

$1.20 $4.50 $4.50 $4.50 $1.20 $4.50 $8.30

What was the mean redemption value he received?

8. What values of a and b make $\triangle GHI \equiv \triangle PQR$?

H

b + 25

G

20   I

P   a + 18

R

30

Q

9. How do you write 0.7 as a percentage?
Write your answer using a percent sign.

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TEST NO. 3

Section A (45 marks) – Choice correct answers in Section A

1. Is 69 a prime number or a composite number?
a) prime number
b) composite number

2. What is the ratio of yellow teapots to purple teapots?

a) 2:7
b) 7:2
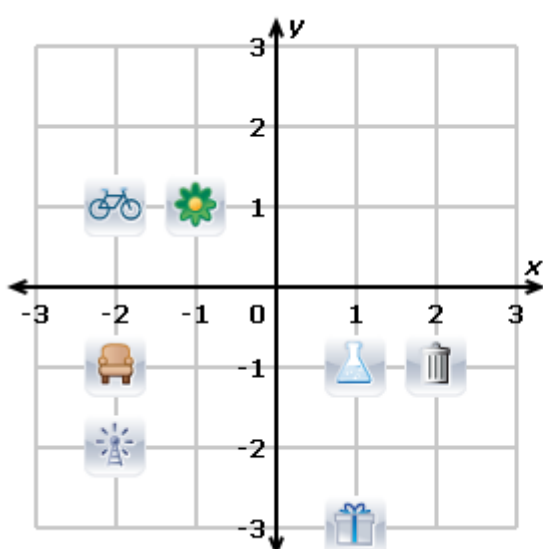**c)** 2:9

3. Are these ratios equivalent?
    28 men : 8 women
    49 men : 14 women
a) yes
b) no

4. Which point is in Quadrant III?
a) (-3;-2)
b) (-4;2)
c) (1; 3)
d) (2;-5)

5. What is at (-1, -1)?

a) science lab
b) furniture store
c) gift shop
d) flower shop

6. What kind of triangle is this?
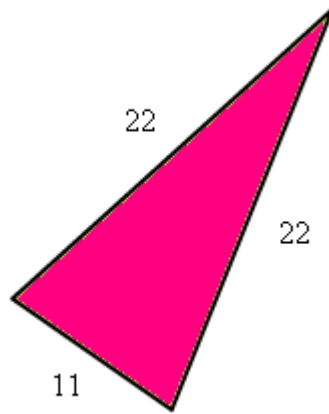
a) isosceles but not equilateral
b) scalene
c) equilateral

7. Which function is nonlinear?

a)

x	0	70	140	210
y	32	64.8	97.6	130.4

b)

x	1	6	11	16
y	626	637	643	677

c)

x	2	6	10	14
y	82.2	71.2	60.2	49.2

d)

x	2	7	12	17
y	832	929.3	1,026.6	1,123.9

8. How many solutions does this equation have?

$8x = 8x - 10$

a) no solution
b) one solution
c) infinitely many solutions

9. Which rule explains why these triangles are congruent?
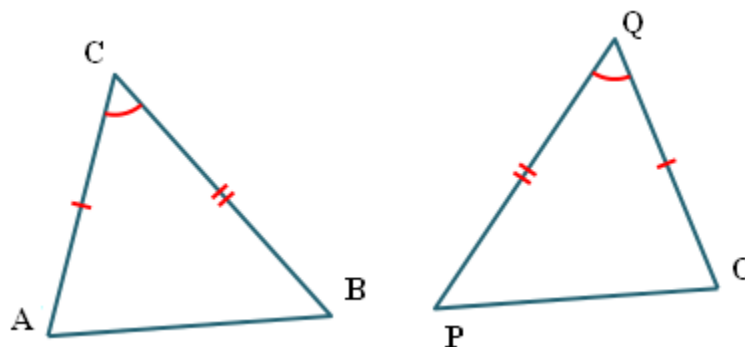
a) side-side-side (SSS)
b) angle-side-angle (ASA)
c) side-angle-side (SAS)
d) none of the above; these triangles cannot be proven congruent

Section B (45 marks) – Answer all questions in Section B

1. What is the volume?

3 cm
3 cm 3 cm
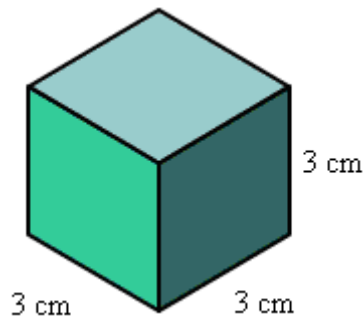
2. Evaluate the expression $ab - b$ for $a = -2$ and $b = -6$.

3. Write an expression that represents the length of the red line. Combine like terms.

s s s s s s s s 9
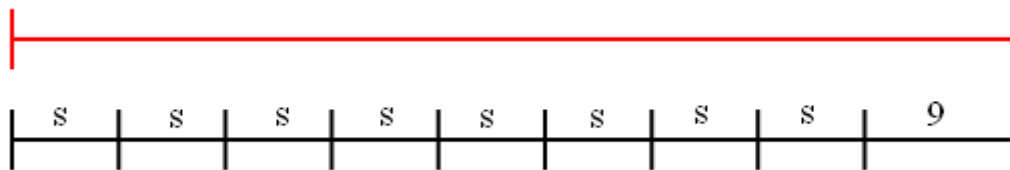
4. Solve for t: $3^t = 243$

5. Mrs. Lawer hosts a annual art contest for kids, and she keeps a record of the number of entries each year.

Art contest entries
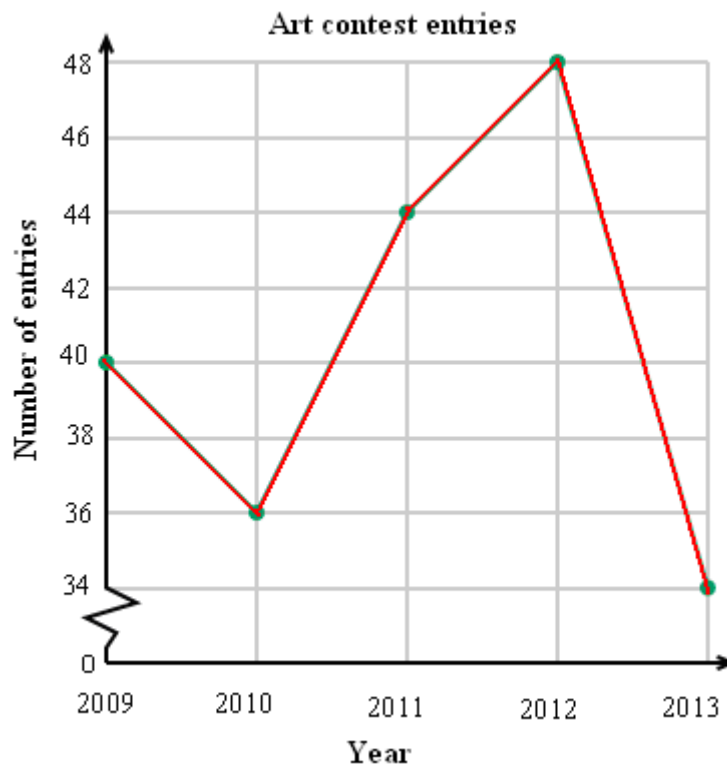
According to the graph, what was the rate of change between 2012 and 2013?

6. The soccer coach is preparing for the upcoming season by seeing how many goals his team members scored last season.

Soccer goals last season	
Goals scored	**Frequency**
0	10
1	5
2	7
3	12
4	3
5	17

How many team members scored fewer than 4 goals last season?

7. Fill in the missing numbers to complete the linear equation that gives the rule for this table.

x	y
0	0
1	-27
2	-54
3	-81

y = ☐ x

8. Solve using elimination: $\begin{cases} -6x + 5y = -10 \\ 7x - 5y = 15 \end{cases}$.

9. AC is tangent to circle. What is BC?
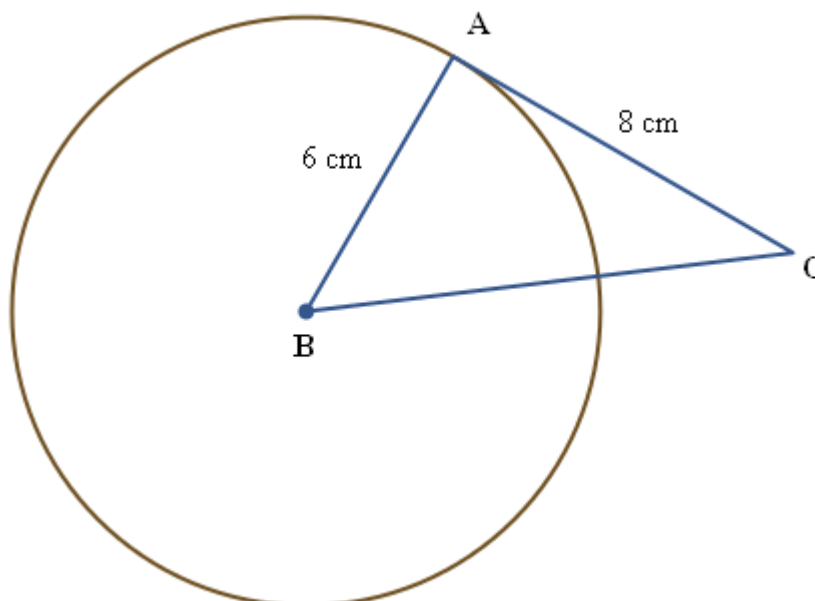
TEST NO. 4

Section A (45 marks) – Choice correct answers in Section A

1. Divide: $\dfrac{6 \times 10^9}{2 \times 10^7} =$

a) 3×10^1

b) 3×10^2

c) 6×10^2

2. Which equation gives the rule for this table?

x	y
1	-24
2	-48
3	-72
4	-96

a) y = -16x
b) y = -24x +6
c) y = -24x
d) y = -16x -8

3. In the cube shown below, which lines are parallel? Select all that apply.
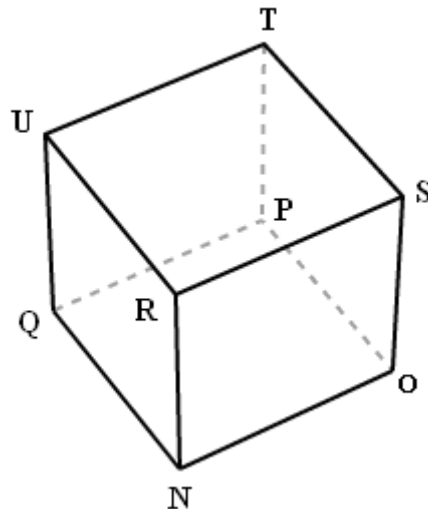
a) PQ and ST
b) TU and ST
c) NR and QU
d) OP and PQ

4. Does (1, 0) make the equation $y = -5x^2 - x + 6$ true?
a) yes
b) no

5. Does this picture have rotational symmetry?

a) yes
b) no

6. Jamar made a 3-dimensional figure out of clay. The figure had 8 vertices and 6 faces. Which figure could Jamar have made?

a)

b)

c)

d)

7. Is $\dfrac{11}{3}$ a natural number?

a) yes
b) no

8. Which is greater?
a) 120% of 14
b) 130% of 18
c) neither; they are equal

9. Are these shapes congruent?

a) yes
b) no

Section B (45 marks) – Answer all questions in Section B

1. Type the missing numbers:

-8   -6   -4   -2   0   ☐   4   ☐   ☐   10

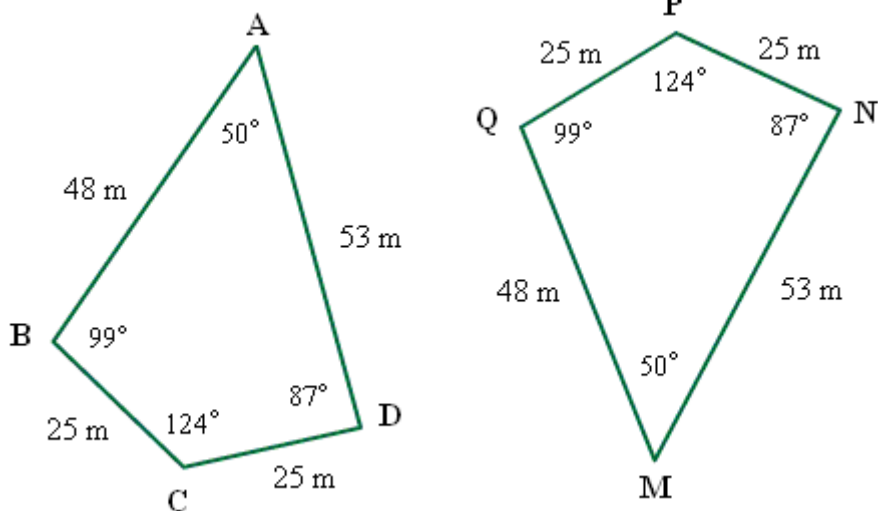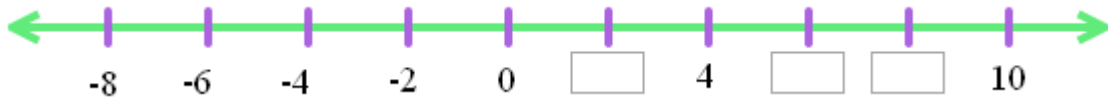**2.** Type these integers in order, from **least** to greatest: 4   ⁻5   3

3. What is the ratio of green ducks to total ducks?

Write your answer using the word "to" (for example, "2 to 3").

4. Professor Smith compiled the scores from the last quiz.
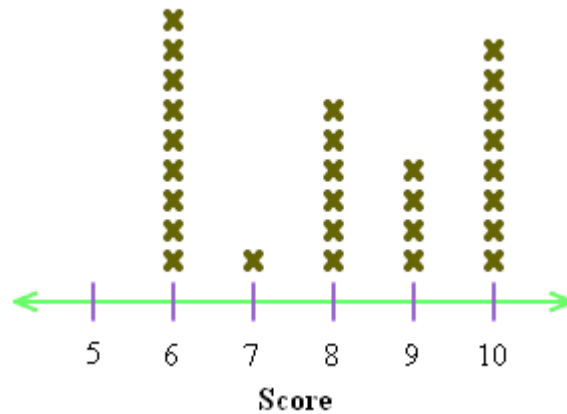
Which score did the greatest number of students receive?

5. The figures below are similar. The labeled sides are corresponding.

8 mm

7 mm

P₁ = 32 mm

P₂ = ? mm
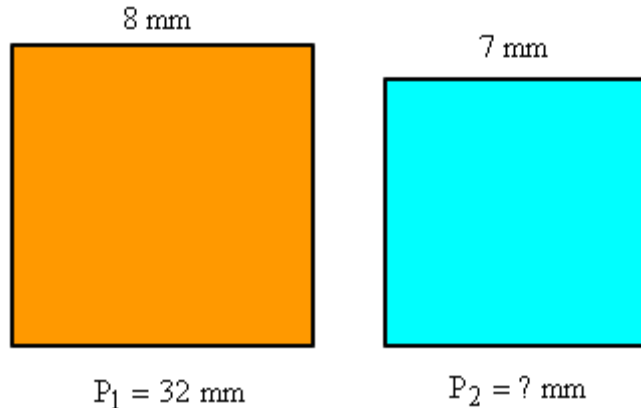
What is the perimeter of the smaller square?

6. Ivy, a forward on her school basketball team, has played in 8 games since starting high school. The number of points she scored at those games was:

9 points	8 points	3 points	8 points
8 points	6 points	4 points	3 points

What was the median number of points scored?

150

7. BC ‖ DE . Fiind AD.

A

12

D

E

20

16

B

C
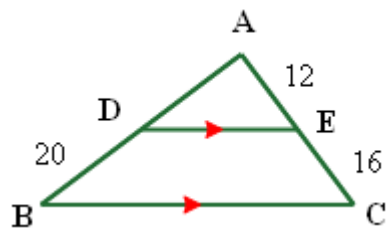
8. Where is the party supply store?

6

5

4

3

2

1

0 1 2 3 4 5 6

party supply store

car dealership

post office

locksmith

pet store

bicycle shop

hotel
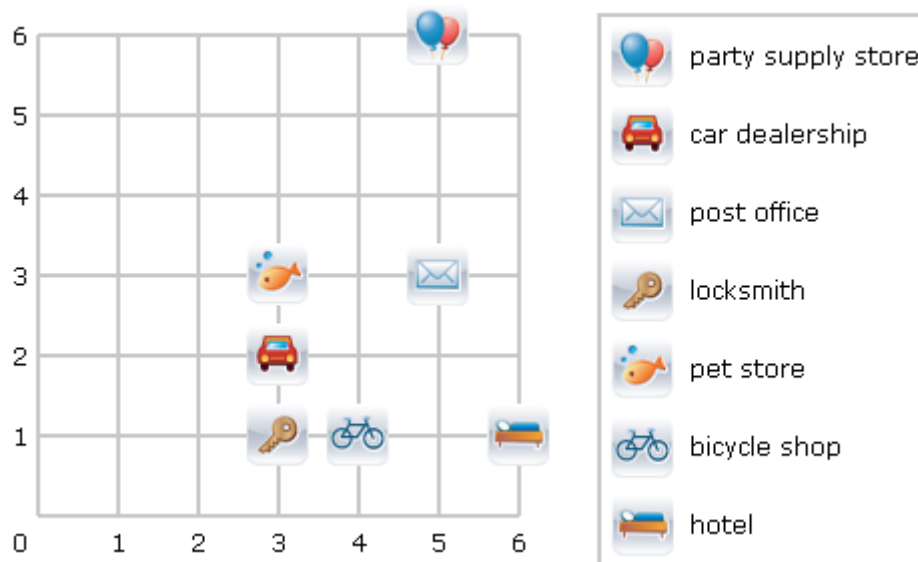
9. What is the area of this figure?

12 cm

7 cm

10 cm

6 cm

19 cm

22 cm

9 cm

41 cm
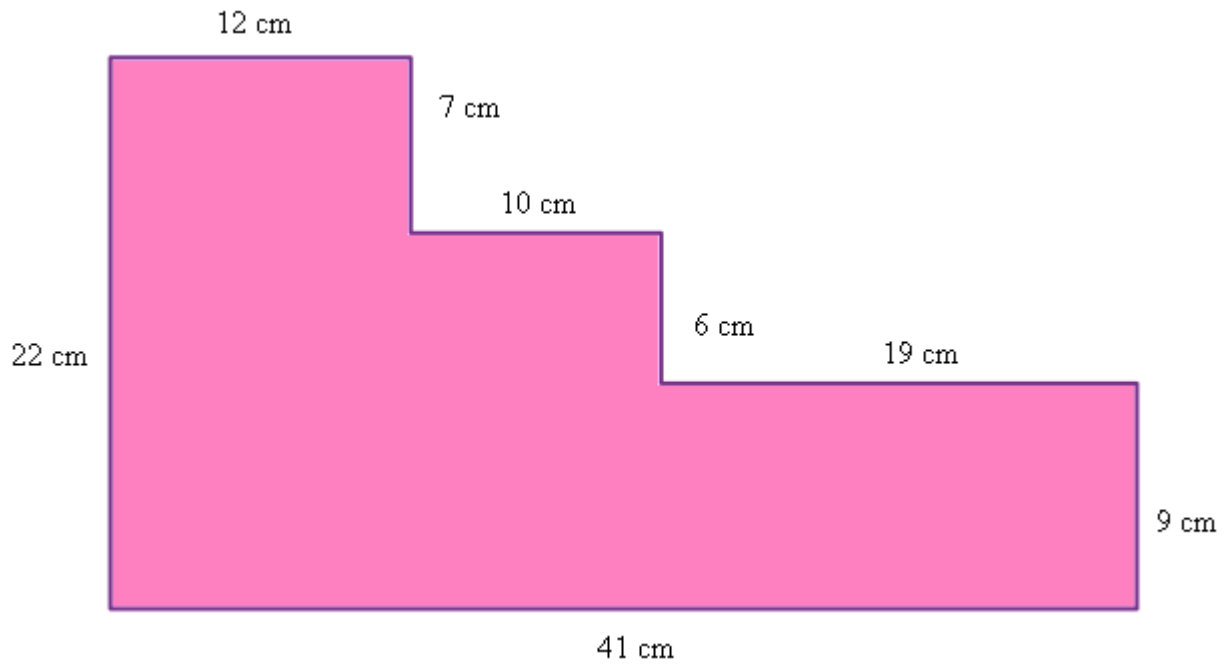
TEST NO. 5

Section A (45 marks) – Choice correct answers in Section A

1. Which sign makes the statement true?

10 **?** -9

a) >

b) <

c) =

2. Look at this graph.
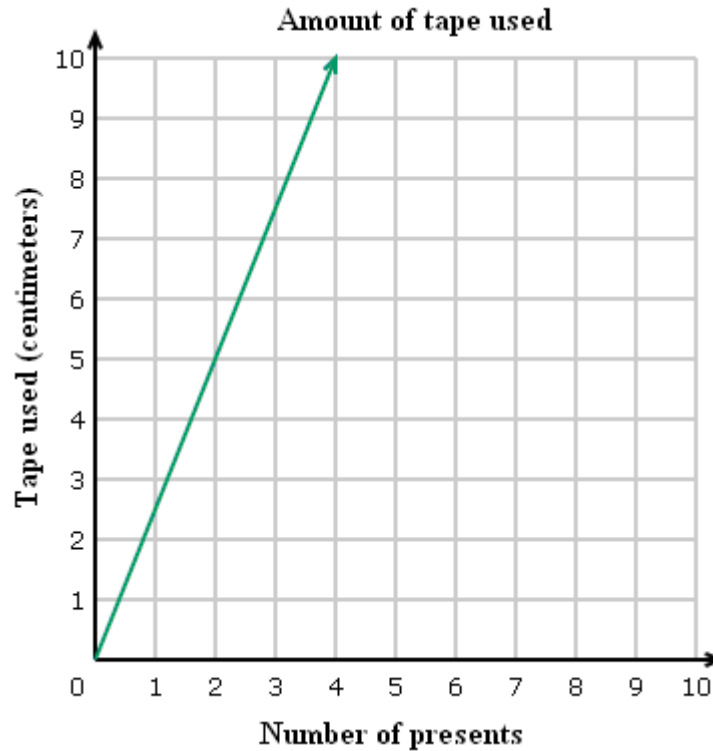
Is there a directly proportional relationship?

a) yes

b) no

3. Which is less?

a) 60% of 160

b) 10% of 1,000

c) neither; they are equal

4. Is this figure a polyhedron?

a) yes

b) no

5. A triangle has sides with lengths of 5 meters, 12 meters, and 13 meters. Is it a right triangle?

a) yes

b) no

6. What is the mode?

0   -8   0   -7   -8   ˉ7   -8

a)   0

b) – 8

c) - 7

7. Which net will make this figure?

a)
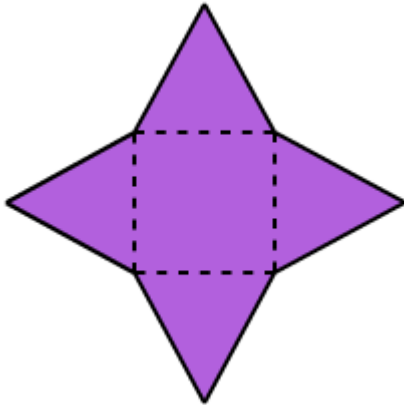
b)
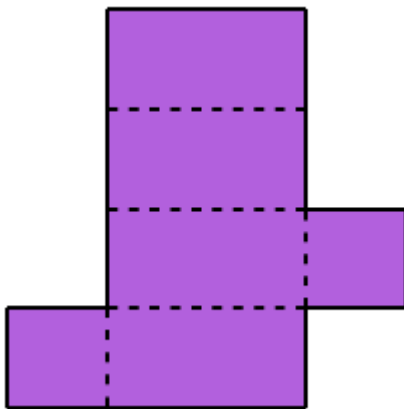
8. Simplify the expression: $7a - 5 - (-2) + 7a =$

a) $14a - 7$

b) – 3

c) $14a - 3$

9. What is AO?
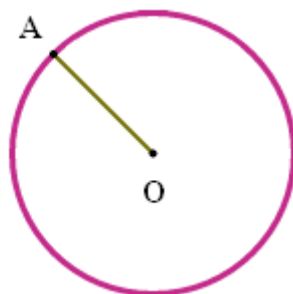
a) chord

b) radius

c) diameter

Section B (45 marks) – Answer all questions in Section B

1. The figures below are similar. The labeled sides are corresponding.

8 cm

3 cm

$A_1 = 64 \, cm^2$ $A_2 = ?$
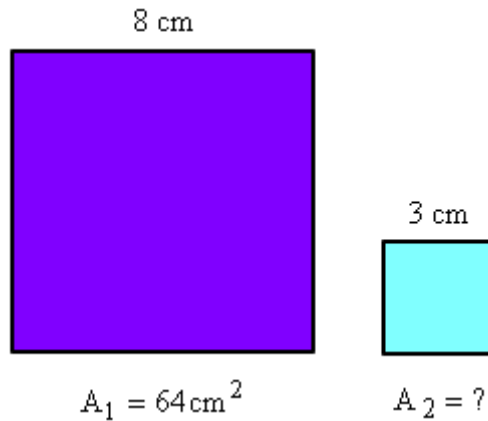
What is the area of the smaller square?

2. What is the ratio of blue starfish to total starfish?

Write your answer as a fraction. Use a slash (/) to separate the numerator and denominator.

3. The point $U(^-5, 1)$ is rotated 270° counterclockwise around the origin. What are the coordinates of the resulting point, U''?
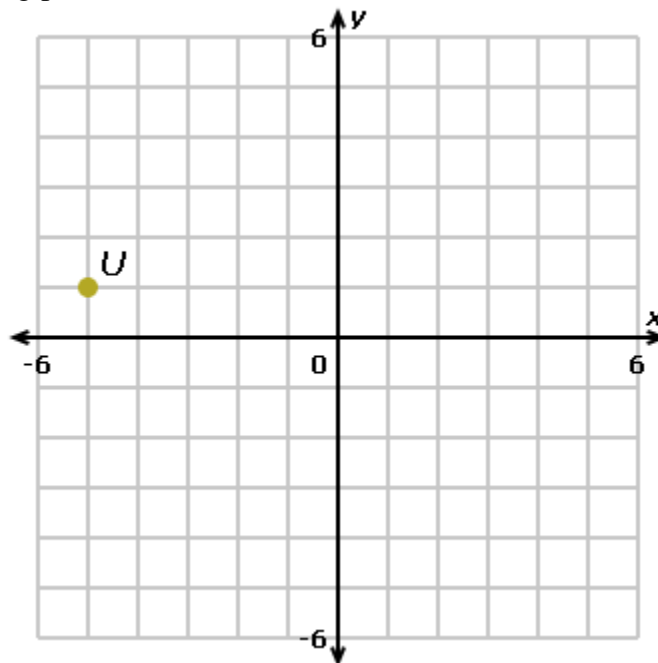
4. Evaluate the expression $v + 4|u|$ for $u = -1$ and $v = -15$.

5. Write the expression using exponents: $55 \cdot 99 \cdot 99 \cdot 99 \cdot 55 \cdot 43 = ?$

6. What is the range?

-1   -4   -8   -3   -7   0   2   0   -1

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7. Type the missing number:

8. Teachers at Dover Elementary School asked students to name their favorite desserts.

Favorite desserts

Frozen yogurt 45%

Brownies 15%

Cookies 40%
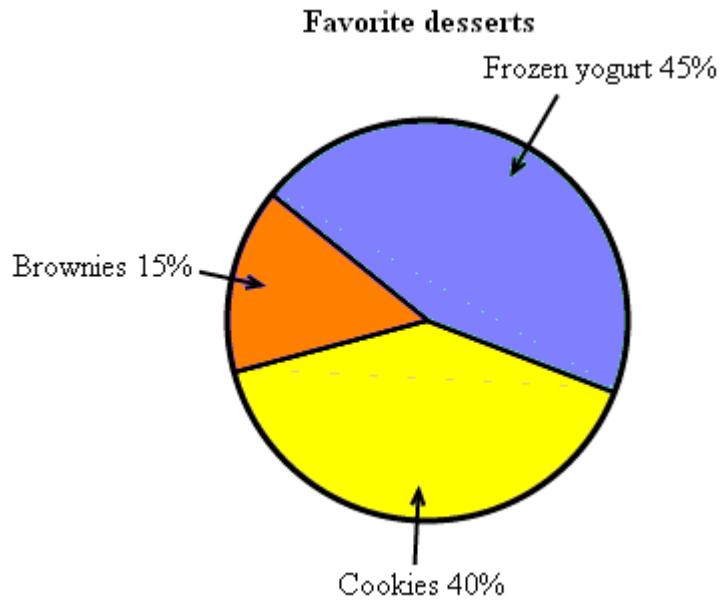
If there were 100 students voting, how many more of them named frozen yogurt as their favorite dessert than brownies?

9. Find the distance between (3, 0) and (8, 12):
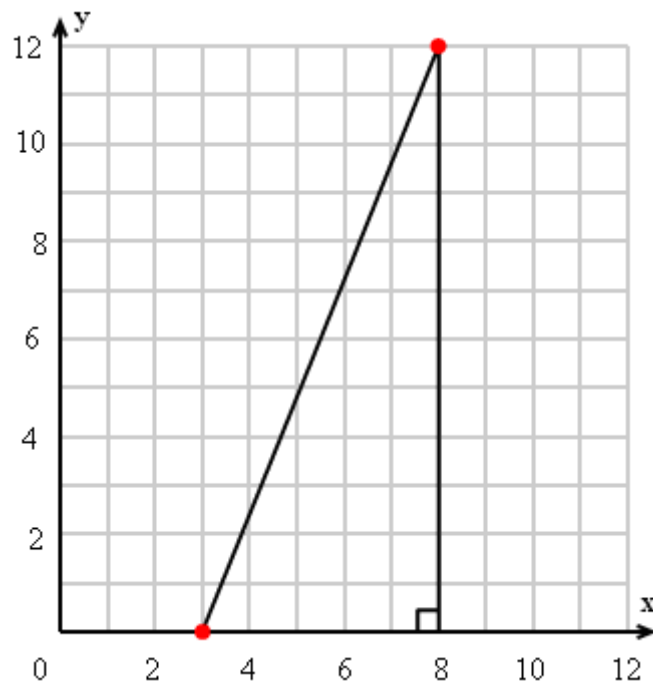
Section A (45 marks) – Choice correct answers in Section A

1. Is the dotted line a line of symmetry?

a) yes
b) no

2. Write $-\dfrac{46}{50}$ as a decimal number.

a) 0.92
b) – 0.82
c) - 0.92

3. Which net will make this figure?

a)
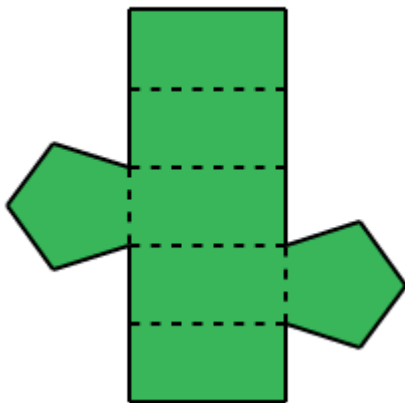
b)
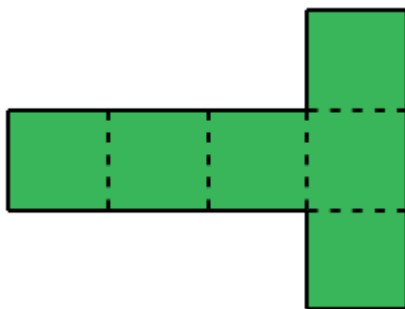
4. Look at this set of 10 numbers:

85	87	10	87	52	49	39	70	72	19

Which value would change the most if the number 60 replaced the number 70 in the set?
a) mean
b) median
c) mode

5. LN and OQ are parallel lines.
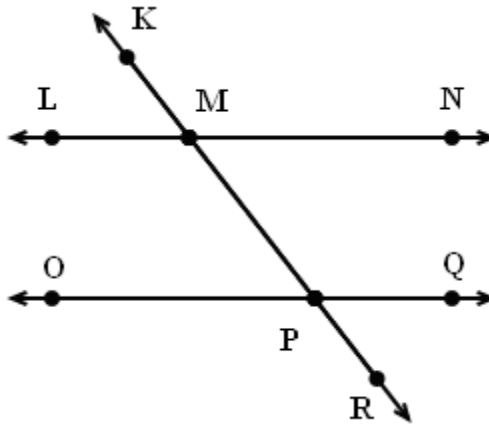
Which angles are supplementary angles?

a) $\hat{OPR}$ and $\hat{QPM}$

b) $\hat{OPR}$ and $\hat{NMQ}$

c) $\hat{OPR}$ and $\hat{LPM}$

d) $\hat{OPR}$ and $\hat{OPM}$

6. How do you write 36% as a fraction in simplest form?

a) $\dfrac{25}{9}$

b) $\dfrac{18}{25}$

c) $\dfrac{9}{25}$

7. Which functions are nonlinear?
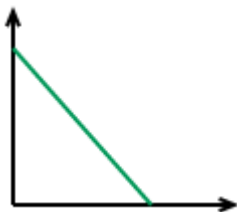
a)
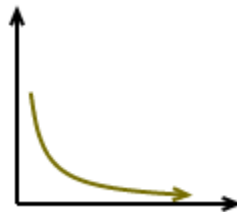
b)
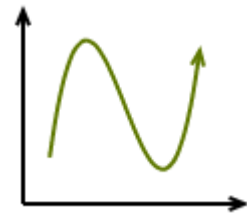
c)

8. The diameter of a circle is 8 centimeters. What is the area?
a) 16π square centimeters
b) 64π square centimeters

9. Is this figure a polyhedron?
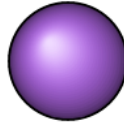
a) yes
b) no

Section B (45 marks) – Answer all questions in Section B

1. Type the next number in this sequence:

| 4, | 5, | 8, | 13, | 20, | 29, | 40, | ____ |

2. Convinced that she could do well as a competitor, Shantaya tracked the scores on a TV game show over the course of a week.

Scores on a TV game show	
Score	**Frequency**
5	10
6	9
7	12
8	0
9	16
10	18

How many people scored more than 8?

3. Evaluate: $\left|16 \div (-1)\right| \div 4 =$

4. The diagram shows a convex polygon.
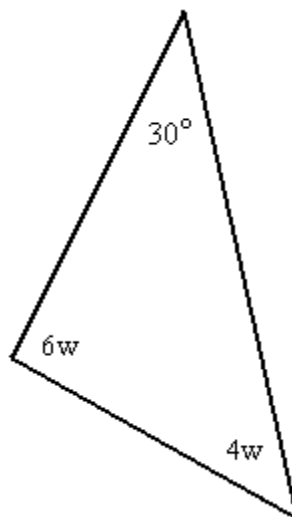
What is the value of w ?

5. During a lab exercise, students in Professor Rao's class rolled a 6-sided die and recorded the results.

Rolls of a 6-sided die
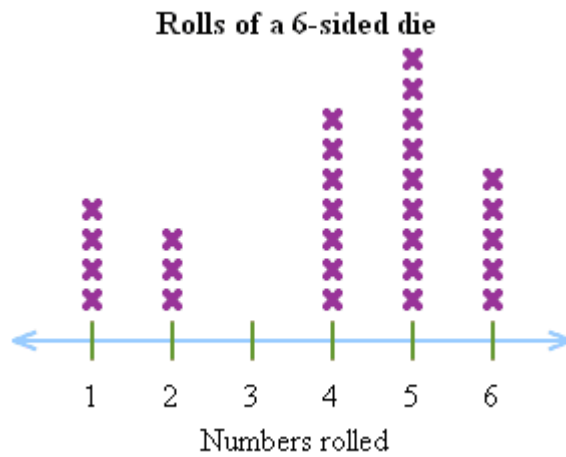
Numbers rolled

Which number was rolled the fewest times?

6. What is the surface area of this cylinder? Use $\pi \approx 3.14$.

8 m

10 m
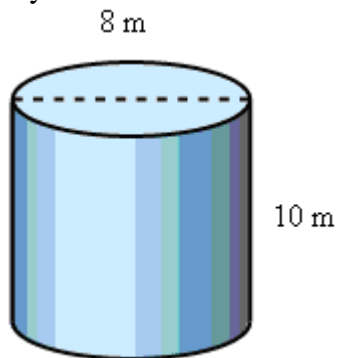
7. In the data set below, what are the median, the lower quartile, and the upper quartile?

35	45	56	66	67	70	94

8. Find *s*.
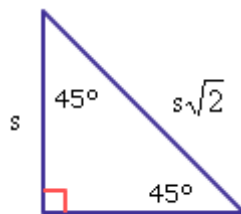
Write your answer in simplest radical form.

9. Find the cosine of $\hat{A}$:
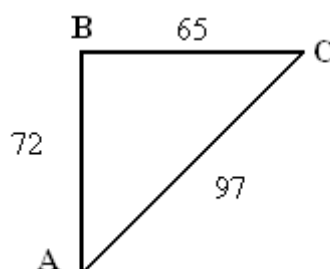
TEST NO. 1

Section A
1. a
2. c
3. c
4. b
5. c
6. b
7. a, c
8. b
9. a

Section B
1. - 10
2. u - 8
3. 2
4. $ 35
5. 28

Solve: The lower quartile is the median of the lower half of the data.
Divide the numbers into a lower half and an upper half.
22 28 28 60 63 66 78 83 84 86 97
Find the lower quartile in the middle of the lower half.
22 28 28 60 63
The lower quartile is 28.

6. 52 meters
7. 5!=120 orders
8. *V'* has coordinates (-2, -3).

Solve: Rotate the point 180° clockwise around the origin. The point will move from Quadrant I to Quadrant III. To find the exact location, imagine (0, 0) and *V* forming opposite corners of a box. Rotate the box, keeping the (0, 0) corner fixed.
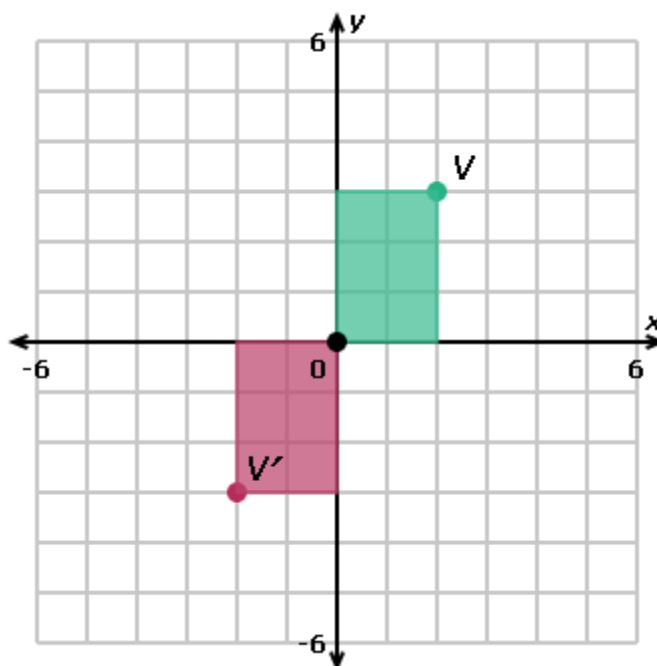
9. 8 centimeters

TEST NO. 2

Section A
1. a, b, d
2. d
3. b
4. d
5. b
6. b
7. b
8. b
9. b

Section B

1. $9.87000 \cdot 10^5$
2. 1 vacation days per year
   Rate of change = change in value/ change in time
3. $ 30
4. 30,…., 62
5. $x > -6$

6. $149°$
7. 4.1
$1.20 + $4.50 + $4.50 +$4.50 +$1.20 +$4.50 + $8.30 = $ 28.7
$28.7 : 7 = 4.1
The mean is the average of the numbers. You find the mean by adding the numbers together and then dividing by the number of numbers in the group.
8. $a = 2$, $b = 5$
9. 70%

TEST NO. 3

Section A
1. b
2. a
3. a
4. a
5. d
6. a
7. b
8. a
9. c

Section B
1. 27 cubic centimeters
2. 18
3. $8s + 9$
4. $t = 5$
5. -14 entries per year
6. 34
7. $y = -27x$
8. $(x, y) = (5; 4)$
9. 10 centimeters

161

TEST NO. 4

Section A
1. b
2. c
3. c
4. a
5. a
6. c
7. b
8. b
9. a

Section B
1. 2, 6 , 8
2. -5 < 3 < 4
3. 2 to 11
4. 6
5. P_2 = 28 mm
6. 7 points
Solve: First, arrange the numbers from least to greatest: 3 3 4 6 8 8 8 9
There is an even number of numbers, so there are two numbers in the middle.
3 3 4 **6 8** 8 8 9
The median is the mean of the two middle numbers. Find the mean of 6 and 8.
6 + 8 = 14 ; 14 ÷ 2 = 7. The median number of points scored was 7.
7. AD = 15
8. (5, 6)
9. 585 square centimeters

TEST NO. 5

Section A
1. a
2. a
3. a
4. a
5. a
6. b The mode is the number that appears most often.
7. a
8. c
9. b

Section B
1. A_2 = 9 square centimeters
2. 3/7
3. *U'* has coordinates (1, 5).
4. -11
5. $43 \cdot 55^2 \cdot 99^3$
6. 10 The range is the difference between the greatest number and the least number.
7. - 25
8. 30 students
9. 13 units

TEST NO. 6

Section A
1. a
2. c
3. a
4. b

Solve: Now replace 70 with 60:   85 87 10 87 52 49 39 **60** 72 19

Finally, calculate the change in the mean, median, and mode.

	Original	New	Change
Mean	57	56	1
Median	61	56	5
Mode	87	87	0

The mean would change by 1, the median would change by 5, and the mode would not change. The median would change the most.

5. d
6. c
7. b, c
8. a
9. b

Section B
1. 53
2. 34
3. 4
4. $15°$
5. 3
6. 351.68 square meters
7. median = 66 ; lower quartile = 45 ; upper quartile = 70

Solve:

The median is the number in the middle when the numbers are arranged from least to greatest.

The lower quartile is the median of the lower half of the data.

The upper quartile is the median of the higher half of the data.

Find the median in the middle of the set.

35 45 56 **66** 67 70 94

The median is 66.

Divide the numbers into a lower half and an upper half.

35 45 56 66 **67 70 94**

Find the lower quartile in the middle of the lower half.

35 45 56

The lower quartile is 45.

Find the upper quartile in the middle of the upper half.

67 70 94

The upper quartile is 70.

8. 3

9. $\cos \hat{A} = \dfrac{72}{97}$

V.2. TEST DE MATEMATICĂ ÎN LIMBA ENGLEZĂ DAT LA ADMITERE[3]

Section A (128 marks) – Answer all questions in Section A

1. Write the following numbers in standard form:
a) 55 695 100 000

Answer:_____ (1)

b) 0.000 003 659

Answer: _____ (1)

c) 24.3 million

Answer: _____ (1)

2. Write the following answers in normal form:
a) the square root of 225

Answer:_____ (1)

b) 5×10^7

Answer:_____ (1)

c) 8.25×10^{-3}

Answer:_____ (1)

3. Ceri earns 263p per hour as a tour guide in the Scottish Borders. She works 38 hours in a week. How much does she earn in a week in pounds?

Answer:_____ (2)

4. Increase £110 by 15%.

Answer:_____ (2)

5. Work out the following, giving your answers in their simplest form:
a) $\dfrac{2}{5} \times \dfrac{9}{11}$

Answer:_____ (2)

b) $\dfrac{3}{5} - \dfrac{3}{7}$

Answer:_____ (3)

c) $4\dfrac{2}{3} \div 2\dfrac{1}{4}$

Answer:_____ (4)

d) Three-eighths of 96

Answer:_____ (2)

6. Solve:
a) $5x + 3 = 1 - x$

Answer:_____ (2)

b) $-5 = \dfrac{3x}{-6}$

Answer:_____ (3)

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[3] Prezentul test de matematică în limba engleză l-am susținut ca probă de concurs la examenul de admitere la Fettes College din Edinburgh în data de 25.02.2013. Calificativul obținut a fost: A (excelent). Timpul de lucru: 90 minute; Echipamentele de lucru necesare permise: instrument de scris, liniar, ciornă. Instrucțiunile de lucru: fără calculator; răspunsuri obligatorii la toate întrebările de la Secțiunea A; răspunsuri la 2 dintre cele 4 întrebări de la Secțiunea B; prezentarea rezolvării; Punctajul total maxim acumulat: 140 puncte.

c) $6 \cdot (5 - 2x) = 2 \cdot (5 - x)$

Answer:_____ (3)

7. A group of 15 friends all choose their favourite numbers and add them together and get a total of 345. Calculate the mean value of favourite number.

Answer:_____ (4)

8. Find angles a, b, c and d
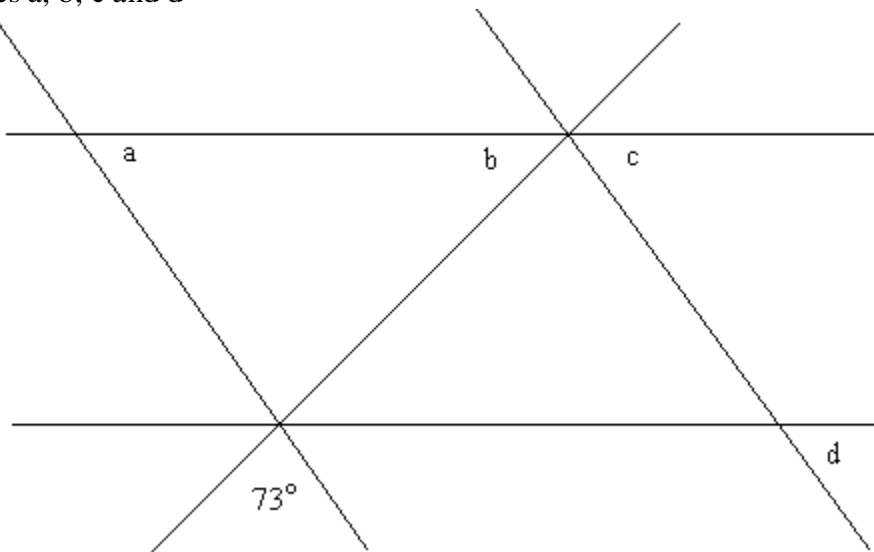
Not drawn to scale!
Lines marked with arrows are parallel to each other.
Lines marked with double dashes are equal in length.

Answer: _a =   b =   c =   d =   __(4)

9. Simplify the following expressions:
a) $2a \times a \times a \times 3a \times a \times b \times 5b \times b / 10$

Answer:_____ (1)

b) $2a + 3a - 10a + a + a + 15b + 22b + b$

Answer:_____ (1)

c) $11x + 15 - 2x$

Answer:_____ (1)

d) $5x^3 - 2x + 18 + 13x^2 - 2x + 15x^3$

Answer:_____ (2)

10. For this question use 3 as an approximate value for π
a) Calculate the area of the circle

Answer:_____ (2)

165
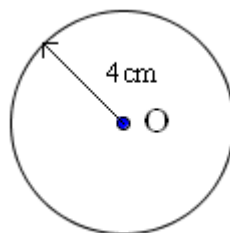
b) Find the circumference of this circle. It also has a radius of 4cm.
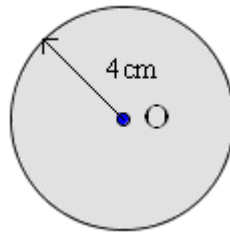
Answer:_____ (2)

11. Jill is in charge of a day-care centre that looks after 40 children between the ages of 4 and 7. She compiles the following table to show their ages.

Age (years)	Frequency
4	4
5	12
6	15
7	9

a) What is the probability that a child selected at random will be 5 years old?

Answer:_____ (1)

b) What is the probability that a child selected at random will be younger than 6?

Answer:_____ (1)

c) What is the median age of children at the centre?

Answer:_____ (1)

12. Show how you would estimate the answer to the following expression without using a calculator, and then calculate your estimate:

$$\frac{10.05 + 39.9}{0.09 \times 49}$$

Answer:_____ (2)

13. Jenna and Rona earn £1470 for making exam papers. They divided the money in the ratio 5:2.

a) How much did each get?

Answer: Jenna _____ (1)

Rona _____ (1)

b) If Rona had got 10% more then how much would she have got in total?

Answer:_____ (1)

14. The travel graph shows the journey of a bus from Edinburgh to Dunbar and back again.
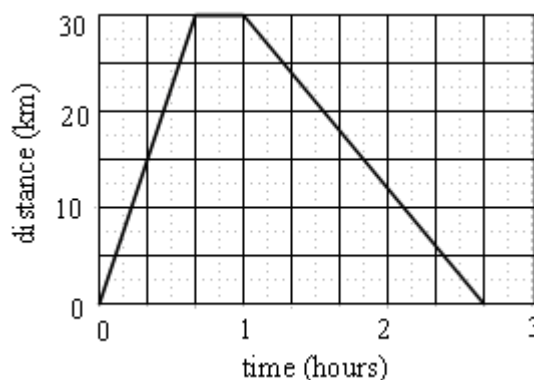
a) How long did the bus stop at Dunbar?

Answer:_____ (1)

b) Find the speed in km/h, of each stage of the journey.

Answer:_____ (1)

15. Solve these simultaneous equations by a suitable method:

$y = 4x + 1$

$y = 20 - 15x$

Answer: ___ x = _____ y = _____(3)

16. Find the value of x in the following diagram
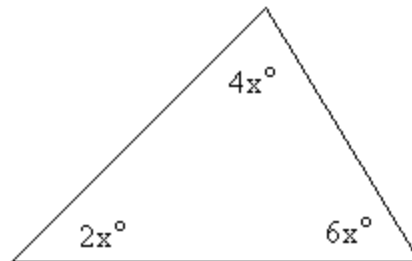
Answer:_____ (3)

17.

a) Expand $2x \cdot \left(x^3 - 7\right)$

Answer:_____ (1)

b) Expand and simplify $5 \cdot (3x - 5) - 3 \cdot (2x - 9)$

Answer:_____ (2)

c) Factories $5a^2 + 15ab$

Answer:_____ (2)

18. In the January sales a store offers 20% off all its Televisions.

a) A TV priced at £1200 is reduced by 20% in the sale. Find the new price of the TV.

Answer:_____ (2)

b) The sale price of a particular TV is £1150. How much was the TV before the sale started?

Answer:_____ (2)

19.

a) Factories $x^2 - 5x - 24$

Answer:_____ (2)

b) Factories $2x^2 - 72$

Answer:_____ (2)

c) Solve $5 - 3x = -x - 3$

Answer:_____ (2)

20. Consider the following diagram:

a) Determine the length of the third side.

Answer:_____ (4)

b) Calculate the area of the triangle.

Answer:_____ (3)

21. How many lines of symmetry do the following letters have?

F Answer:_____ (1)

M Answer:_____ (1)

O Answer:_____ (1)

22. The nth term of a sequence is defined by the formula: n^{th} term= 15 - 5n.
Find the first 4 terms of the sequence.

Answer: _1stterm =   2ndterm =   3rdterm =   4^{tht}term =   _(4)

23. ABC is a triangle. Let Angle $A = x^{\circ}$.
a) If angle B is three times Angle A then write down an expression for Angle B in terms of x.
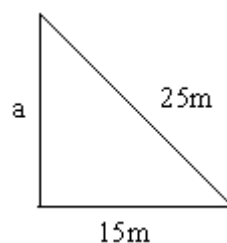
Answer:_____ (2)

b) If angle C is 55° less then Angle A then write an expression for Angle C in terms of x.

Answer:_____ (2)

c) Make an equation in x and solve it to find the size of each of the three angles.

Answer: _A =   B =   C = _(3)

24.
a) Rearrange the equation $x = 2r + 5pq$, making r the subject.

Answer:_____ (3)

b) In the equation $x = 2r + 5pq$, $r = -3$, $p = -4$ and $q = -5$. Find x.

Answer:_____ (3)

25. Steven buys a box of chocolates. James eats 1/2 of the chocolates. Cen eats 3/5 of the remaining chocolates leaving poor Jenna with only 4 chocolates left. How many chocolates were in tha box originally?

Answer:_____ (4)

26. Find the area of this isosceles triangle - remember to give your answer in the correct units.

25 cm

40 cm
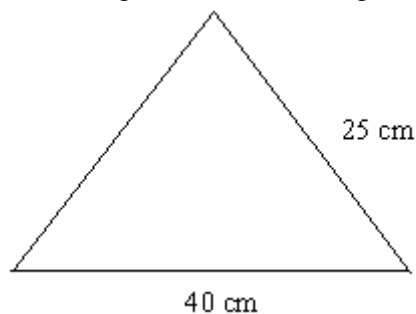
Answer:_____ (4)

27. Solve $\dfrac{2x - 3}{x} = \dfrac{1}{x}$.

Answer:_____ (4)

28. Zing = 2Zong and Zap = 2Zing + 3. If Zong = 3 then what is the value of Zap.

Answer:_____ (2)

29. Make formulae for the perimeter P and area A, of this shape:
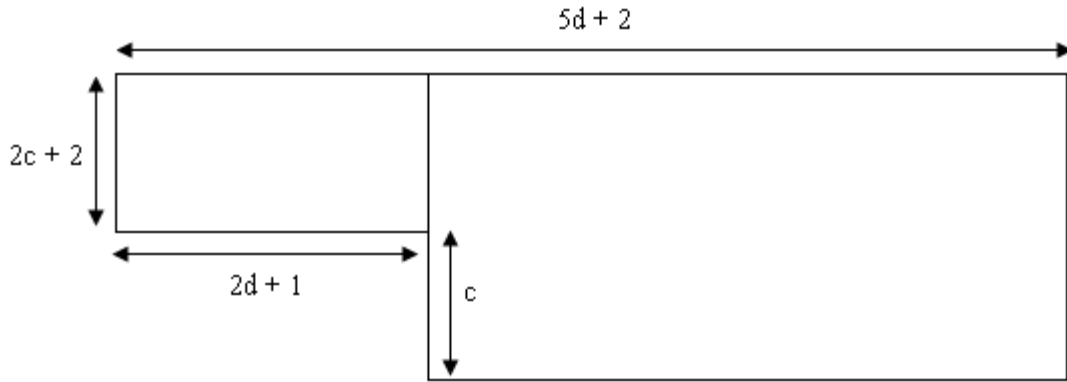
Answer: P = _____ (3)

A = _____ (3)

Section B (12 marks) – Answer 2 out of 4 questions in Section B

1. The number of goals scored by the Backstreet Windie Smashers Football Club in their ten matches this season are as follows:

0, 1, 3, 0, 4, 2, 4, 1, 2, x

Show clearly how you have obtained there answers.

a) If the mean number of goals per game they score is 2.2 then what is the value of x?

Answer:_____ (2)

b) What is the Modal number of goals per game?

Answer:_____ (1)

c) What is the Median number of goals per game?

Answer:_____ (2)

d) What is the range of the number of goals scored?

Answer:_____ (1)

2. The period of time that it takes a pendulum to complete one period T, is directly proportional to the square root of its length, L. A certain pendulum has a period of 18 seconds when its length is 36 centimeters.

a) Write down a formula to express T in terms of L.

Answer:_____ (2)

b) Find the period T when the length in 49 centimeters.

Answer:_____ (2)

c) Work out the length x when the period is 36 seconds.

Answer:_____ (2)

3. If $a = 2, b = 5, c = -3$ and $d = -1$ calculate:
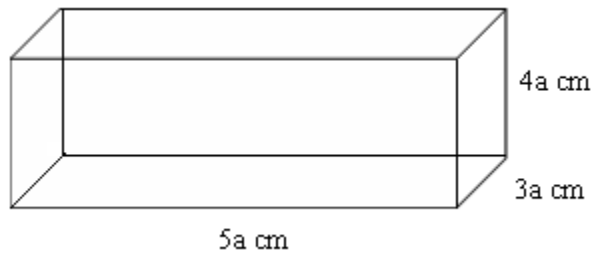
a) $a + b + c$

b) $2b^2$

c) $(2b)^2$

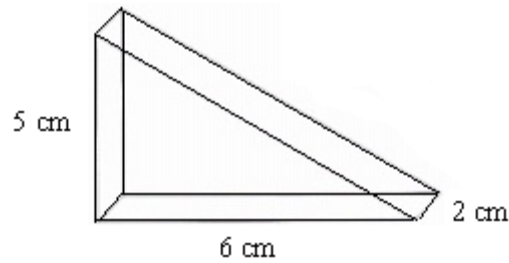**d)** $a \cdot (b - d)$

e) $c^2 + d^2$

Answer:_____ (6)

169

4. Find the volume of each of these shapes:

a)

4a cm

3a cm

5a cm

Answer: Volume = _____ (3)

b)

5 cm

6 cm

2 cm

Answer: Volume = _____ (3)

END OF PAPER!

Answers - Section A:

1. a) $55\,695\,100\,000 = 5.56951 \times 10^{10}$

b) $0.000\,003\,659 = 3.659 \times 10^{-6}$

c) 24.3 million $= 2.43 \times 10^{7}$

2. a) $225 \quad \sqrt{225} = \sqrt{15^2} = 15$

b) $5 \times 10^{7} = 50000000$

c) $8.25 \times 10^{-3} = 0.00825$

3.   263 p................................1h

   $\underline{\text{ x p.............................38h}}$

   $x = 263 \times 38 = 9994p = 9994 \div 100 = 99.94 \, \text{pounds}$

4. $\dfrac{15}{100} \times 110 = \dfrac{33}{2}$; $110 + \dfrac{33}{2} = \dfrac{220+33}{2} = \dfrac{253}{2} = 126.5 \text{£}$

5. a) $\dfrac{2}{5} \times \dfrac{9}{11} = \dfrac{2 \times 9}{5 \times 11} = \dfrac{18}{55}$

b) $^{7)}\dfrac{3}{5} - ^{5)}\dfrac{3}{7} = \dfrac{21-15}{35} = \dfrac{6}{35}$

c) $4\dfrac{2}{3} \div 2\dfrac{1}{4} = \dfrac{4 \times 3 + 2}{3} \div \dfrac{2 \times 4 + 1}{4} = \dfrac{14}{3} \div \dfrac{9}{4} = \dfrac{14}{3} \times \dfrac{4}{9} = \dfrac{56}{27}$

d) $\dfrac{3}{8} \times 96 = 3 \times 12 = 36$

170

6. a) $5x + 3 = 1 - x \Rightarrow 6x = -2 \Rightarrow x = -\dfrac{1}{3}$

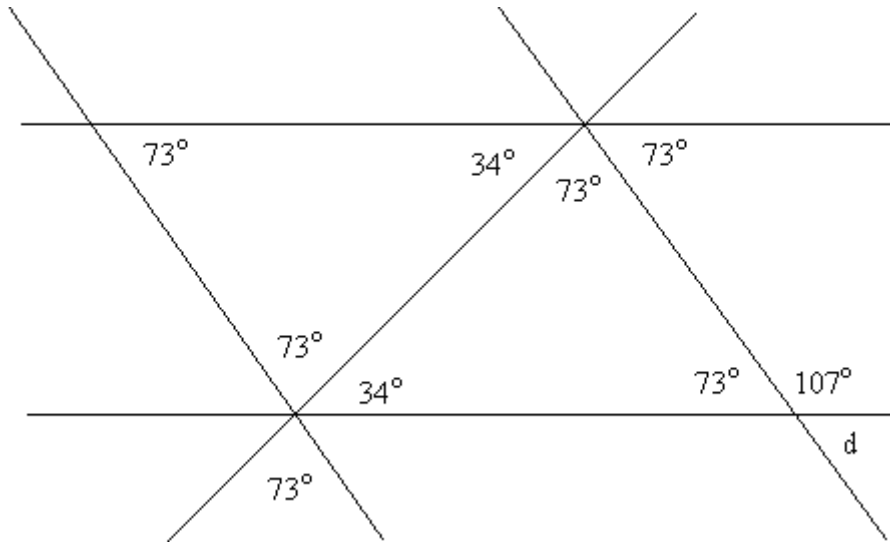**b)** $-5 = \dfrac{3x}{-6} \Rightarrow 30 = 3x \Rightarrow x = 10$

c) $6 \cdot (5 - 2x) = 2 \cdot (5 - x) \Rightarrow 30 - 12x = 10 - 2x \Rightarrow 30 - 10 = -2x + 12x \Rightarrow 20 = 10x \Rightarrow x = 2$

7. 15 friends: a_1, a_2, a_3, ..., a_{15}

$\dfrac{a_1 + a_2 + a_3 + ... + a_{15}}{15} = \dfrac{345}{15} = \dfrac{15 \times 23}{15} = 23$

345	5
69	3
23	23

8.

$a = 73^{\circ}$

$b = 180^{\circ} - 73^{\circ} = 107^{\circ}$

$c = 180^{\circ} - 73^{\circ} - 34^{\circ} = 73^{\circ}$

$d = 180^{\circ} - 73^{\circ} = 107^{\circ}$

9. a) $2a \times a \times a \times 3a \times a \times b \times 5b \times b / 10 = 6a^5 \times 5b^3 / 10 = 3a^5 \times b^3$

b) $2a + 3a - 10a + a + a + 15b + 22b + b = -3a + 38b$

c) $11x + 15 - 2x = 9x + 15$

d) $5x^3 - 2x + 18 + 13x^2 - 2x + 15x^3 = 20x^3 + 13x^2 - 4x + 18$

10. a) $A_{circle} = \pi \times r^2 = 3 \times 4^2 = 48 cm^2$

b) Circumference $= 2\pi \times r = 2 \times 3 \times 4 = 24 cm$

11. a) $P = \dfrac{12^{(4}}{40} = \dfrac{3}{10} = 0.3$

b) $P = \dfrac{4 + 12}{40} = \dfrac{16^{(8}}{40} = \dfrac{2}{5} = 0.4$

c) 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7

$6 + 6 = 12$

$12 \div 2 = 6$

12. I estimate each number to the first decimal

$$\Rightarrow 10.05 \cong 10.1 \; ; \; 39.9 \cong 39.9 \; ; \; 0.09 \cong 0.1 \; ; \; 49 = 49$$

$$\frac{10.05 + 39.9}{0.09 \times 49} \cong \frac{10.1 + 39.9}{0.1 \times 49} \cong \frac{50}{4.9} \cong \frac{49}{4.9} + \frac{1}{4.9} \cong 10 + 0.2 \cong 10.2$$

$$\frac{10.05 + 39.9}{0.09 \times 49} = \frac{\dfrac{1005}{100} + \dfrac{3990}{100}}{\dfrac{9}{100} \times 49} = = \frac{4995}{100} \times \frac{100}{9 \times 49} = \frac{5 \times 9 \times 3 \times 37}{9 \times 49} = \frac{15 \times 37}{49} = \frac{555}{49} = 11.32$$

13. a) J = Jenna, R = Rona $\Rightarrow \dfrac{J}{5} = \dfrac{R}{2} = \dfrac{J + R}{5 + 2} = \dfrac{1470}{7} = 210$

$J = 5 \times 210 = £\, 1050$
$R = 2 \times 210 = £\, 420$

b) $\dfrac{10}{100} \times 420 = 42 \; ; \; 420 + 42 = £\, 462$

14. a) 20 min or 1/3 hours

b) v = speed ; d = distance ; t = time

60 min…………………..1 h
40 min…………………x h
x = 2/3 h

60 min………………......1 h
100 min……………………y h
y = 5/3 h

$$v = \frac{d}{t} \Rightarrow \begin{cases} v_1 = \dfrac{30 \, km}{40 \, min} = 30 \times \dfrac{3}{2} \dfrac{km}{h} = 45 km/h \\[3mm] v_2 = 0 \, km/h \\[3mm] v_3 = \dfrac{30 \, km}{100 \, min} = 30 \times \dfrac{3}{5} \dfrac{km}{h} = 18 km/h \end{cases}$$

15. $\begin{cases} y = 4x + 1 \\ y = 20 - 15x \end{cases} \Rightarrow 4x + 1 = 20 - 15x \Rightarrow 19x = 19 \Rightarrow \begin{cases} x = 1 \\ y = 7 \end{cases}$

16. $2x° + 4x° + 6x° = 180° \Rightarrow 12x° = 180° \Rightarrow x° = \dfrac{2 \times 9 \times 2 \times 5}{2 \times 3 \times 2} = 15°$

17. a) $2x \cdot \left(x^3 - 7\right) = 2x^4 - 14x$

b) $5 \cdot (3x - 5) - 3 \cdot (2x - 9) = 15x - 25 - 6x + 27 = 9x + 2$

c) $5a^2 + 15ab = 5a \cdot (a + 3b)$

18. a) $\dfrac{20}{100} \times 1200 = 240 \; ; \; 1200 - 240 = £\, 960$

b) $x - \dfrac{20}{100} \times x = \dfrac{100x - 20x}{100} = \dfrac{80x}{100} = \dfrac{8x}{10} \Rightarrow \dfrac{8x}{10} = 1150 \Rightarrow x = \dfrac{11500}{8} = £\, 1437.5$

19. a) $x^2 - 5x - 24 = x^2 - 8x + 3x - 24 = x \cdot (x-8) + 3 \cdot (x-8) = (x+3) \cdot (x-8)$

b) $2x^2 - 72 = 2 \cdot (x^2 - 36) = 2 \cdot (x-6) \cdot (x+6)$

c) $5 - 3x = -x - 3 \Rightarrow -2x = -8 \Rightarrow x = 4$

20. a) Pythagorean Theorem

$\Rightarrow a^2 + 15^2 = 25^2 \Rightarrow a^2 = 25^2 - 15^2 \Rightarrow a = \sqrt{625 - 225} = \sqrt{400} = 20\,\text{m}$

b) $A_{\text{triangle}} = \dfrac{20 \times 15}{2} = 150\,\text{m}^2$

21.
$$\begin{array}{ll} \mathbf{F} & 0 \\ \mathbf{M} & 1 \\ \mathbf{O} & 2 \end{array}$$

22. 1^{st}term $= 15 - 10 = 10$
2^{nd}term $= 15 - 10 = 5$
3^{rd}term $= 15 - 15 = 0$
4^{tht}term $= 15 - 20 = -5$

23. a) $B = 3A = 3x°$

b) $C = A - 55° = x° - 55°$

c) $x° + 3x° + x° - 55° = 180° \Rightarrow 5x° = 235° \Rightarrow x° = 47° \Rightarrow A = 47°; B = 141°; C = -8° \Rightarrow$
It doesn't exist

Obs: if Angle C is $55°$ more than Angle A $\Rightarrow C = x° + 55° \Rightarrow x° + 3x° + x° + 55° = 180°$
$\Rightarrow x° = 25° \Rightarrow A = 25°$; $B = 75°$; $C = 80°$

24. a) $x = 2r + 5pq \Rightarrow 2r = x - 5pq \Rightarrow r = \dfrac{x - 5pq}{2}$

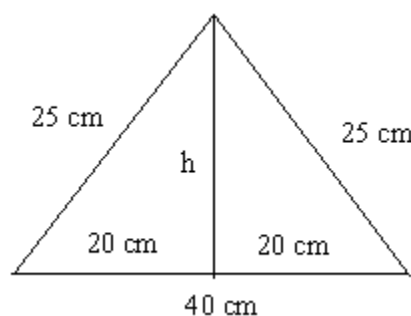**b)** $x = 2r + 5pq = 2 \cdot (-3) + 5 \cdot (-4) \cdot -6 + 100 = 94$

25. B = box of chocolates

James: $\dfrac{1}{2} \cdot B = \dfrac{B}{2} \Rightarrow$ remaining: $B - \dfrac{1}{2}B = \dfrac{B}{2}$

Ceri: $\dfrac{3}{5} \cdot \dfrac{B}{2} = \dfrac{3B}{10} \Rightarrow$ remaining: $\dfrac{B}{2} - \dfrac{3B}{10} = \dfrac{2B}{10} = \dfrac{B}{5}$

$\dfrac{B}{5} = 4 \Rightarrow B = 20\,\text{chocolates}$

26. Pythagorean Theorem $\Rightarrow h = \sqrt{25^2 - 20^2} = \sqrt{225} = 15 \Rightarrow A_{\text{triangle}} = \dfrac{40 \times 15}{2} = 300\,\text{cm}^2$

27. $\dfrac{2x-3}{x} = \dfrac{1}{x}$; $x \neq 0$; $x \cdot (2x-3) = x$ $\mid : x \Rightarrow 2x-3=1 \Rightarrow x=2$

28. $\begin{cases} \text{Zing} = A \\ \text{Zong} = B \Rightarrow \\ \text{Zap} = C \end{cases} \begin{cases} A = 2B \\ C = 2A+3 \Rightarrow \\ B = 3 \end{cases} \begin{cases} A = 2 \cdot 3 = 6 \\ C = 2 \cdot 6 + 3 = 15 \end{cases}$

29. $P = (5d+2) + (2c+2+c) + (5d+2-2d-1) + c + (2d+1) + (2c+2)$

$P = 5d + 2 + 3c + 2 + 3d + 1 + c + 2d + 1 + 2c + 2$

$P = 10d + 6c + 8$

$A = (2c+2) \cdot (2d+1) + (2c+2+c) \cdot (5d+2-2d-1)$

$A = (2c+2) \cdot (2d+1) + (3c+2) \cdot (3d+1)$

$A = 4cd + 2c + 4d + 2 + 9cd + 3c + 6d + 2$

$A = 13cd + 5c + 10d + 4$

Answers - Section B:

1. a) $\dfrac{17+x}{10} = 2.2 \Rightarrow x = 5$

b) 0; 1; 2; 4

c) 2

d) 5

2. a) $T = k \cdot \sqrt{L} \Rightarrow k = \dfrac{T}{\sqrt{L}} = 3$

b) $T = 3 \cdot \sqrt{49} = 21s$

c) $T = 36s$

$36 = 3\sqrt{x} \Rightarrow x = 144cm$

3. a) $a+b+c = 4$

b) $2b^2 = 2 \times 25 = 50$

c) $(2b^2) = (2 \times 5)^2 = 10^2 = 100$

d) $a \cdot (b-d) = 2 \cdot (5+1) = 2 \cdot 6 = 12$

e) $c^2 + d^2 = (-3)^2 + (-1)^2 = 3^2 + 1^2 = 9 + 1 = 10$

4. a) $V = 3a \times 4a \times 5a = 60a^3 \, cm^3$

b) $V = \dfrac{5 \times 6}{2} \times 2 = 30 cm^3$

Acute angle