

Note: This exam has special instructions.
Answer the questions according to these instructions.

שימו לב: בבחינה זו יש הנחיות מיוחדות.
יש לענות על השאלות על פי הנחיות אלה.

Mathematics

3 Points – 2nd Exam

מ ת מ ט י ק ה

3 יחידות לימוד – שאלון שני

Instructions

א. Duration of the exam: One hour and forty-five minutes.

ב. Exam structure and breakdown of points:

This exam has six questions.

Each question is worth 27 points.

You may answer as many questions as you like, completely or partially, but the maximum number of points you can earn is 100.

ג. Material that may be used during the exam:

(1) A non-graphing calculator. You may not use the programming options of a programmable calculator.

Use of a graphing calculator or programming options may lead to the disqualification of your exam.

(2) Formula sheets (attached).

(3) A Hebrew–foreign language / foreign language–Hebrew dictionary.

ד. Special instructions:

(1) Do not copy the question, but do indicate the number of the question you are answering.

(2) Start each answer on a new page. Write the steps of the solution in your answer booklet, even when the calculations are done with a calculator.

Explain all your work, including calculations, in detail and in a clear and organized fashion.

Lack of detail may lower your score or lead to disqualification of your exam.

Write in the answer booklet only. Write "טיוטה" at the top of every page you use for rough work.

If you use pages outside the answer booklet for rough work, your exam may be disqualified.

הוראות

א. משך הבחינה: שעה וארבעים וחמש דקות.

ב. מבנה השאלון ומפתח ההערכה:

בשאלון זה שש שאלות.

לכל שאלה – 27 נקודות.

מוותר לכם לענות, באופן מלא או חלקי, על מספר שאלות כרצונכם, אך סך הנקודות שתוכלו לצבור לא יעלה על 100.

ג. חומר עזר מותר בשימוש:

(1) מחשבון לא גרפי. אין להשתמש באפשרויות

התכנות במחשבון שיש בו אפשרות תכנות.

שימוש במחשבון גרפי או באפשרויות התכנות

במחשבון עלול לגרום לפסילת הבחינה.

(2) דפי נוסחאות (מצורפים).

(3) מילון עברי–לועזי/לועזי–עברי.

ד. הוראות מיוחדות:

(1) אין להעתיק את השאלה; יש לסמן את מספרה בלבד.

(2) יש להתחיל כל שאלה בעמוד חדש. יש לרשום במחברת את

שלבי הפתרון, גם כאשר החישובים מתבצעים בעזרת מחשבון.

יש להסביר את כל הפעולות, כולל חישובים, בפירוט

ובצורה ברורה ומסודרת.

חוסר פירוט עלול לגרום לפגיעה בציון או לפסילת הבחינה.

יש לכתוב במחברת הבחינה בלבד. יש לרשום "טיוטה" בראש כל עמוד המשמש טיוטה.

כתיבת טיוטה בדפים שאינם במחברת הבחינה עלולה לגרום לפסילת הבחינה.

Good Luck!

בהצלחה!

Questions

This exam has six questions. A complete answer is worth 27 points. You may answer as many questions as you like, completely or partially, but the maximum number of points that you can earn is 100.

Algebra

1. The figure on the right shows the parabola $y = x^2 - 8x + 17$ and a line whose equation is $y = 4x - 19$.

Point C is the vertex of the parabola.

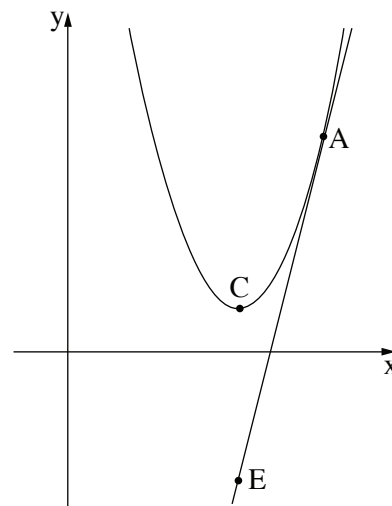
- א. Find the coordinates of Vertex C.
- ב. Find the intervals on which the parabola is increasing and decreasing.

The line and the parabola meet at Point A.

- ג. Find the coordinates of Point A.

Point E is located on the line and its x-coordinate is the same as the x-coordinate of the vertex of the parabola.

- ד. Find the coordinates of Point E.



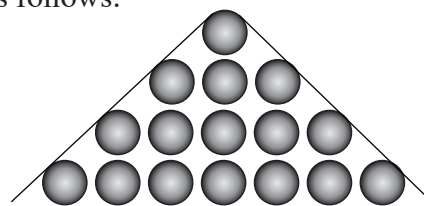
2. Some balls are placed on a table in rows arranged in the shape of a triangle.

The number of balls in each row forms an arithmetic sequence, as follows:

in the first row – 1 ball, in the second row – 3 balls,

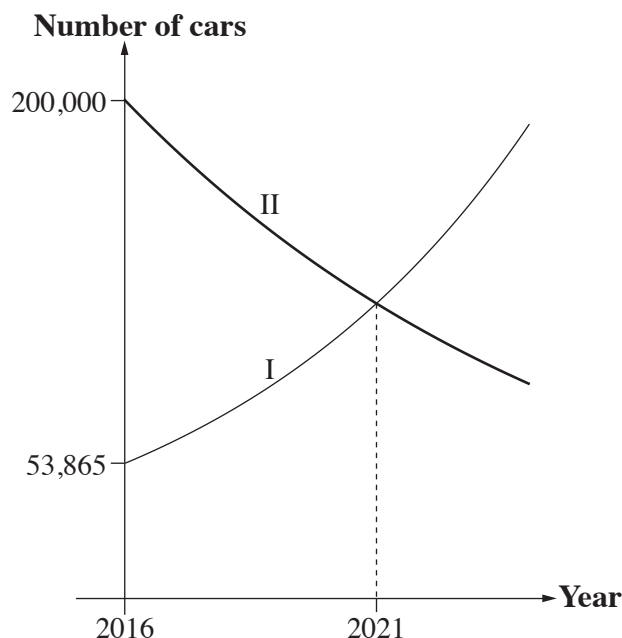
in the third row – 5 balls, and so on (see figure).

- א. What would be the number of balls in the sixth row of the triangle?
- ב. What would be the total number of balls in the first 8 rows of the triangle?
- ג. How many rows will the triangle have when it contains a total of 144 balls?



3. The number of electric cars in a certain country increases annually by a fixed percentage, and the number of gas (petrol) cars decreases by a fixed percentage.

Graphs I–II below describe the number of electric cars and the number of gas cars by year in this country, from the beginning of 2016 onwards.



- א. Which of the graphs, I or II, describes the number of gas cars in this country?

We know that the number of gas cars decreases annually by 10% .

- ב. What was the number of gas cars in this country at the beginning of 2021?

At the beginning of 2021 the number of gas cars in this country was the same as the number of electric cars.

- ג. By what percentage does the number of electric cars in this country increase annually?
ד. At the beginning of which year were there 86,271 electric cars in this country?

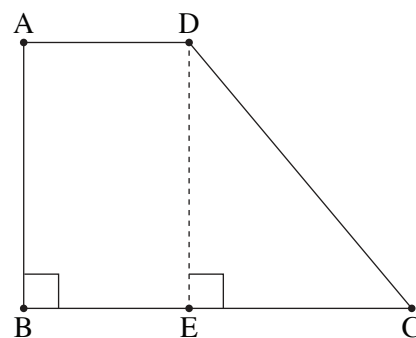
Trigonometry

4. The figure on the right shows a right trapezoid $ABCD$ ($\angle ABC = 90^\circ$, $AD \parallel BC$).

Point E is located on Side BC such that Segment DE is perpendicular to Side BC .

We know that $AD = 12$, $BC = 28$, $DC = 25$.

- א. Find the length of Segment EC .
ב. Find the size of Angle DCE .
ג. Find the length of Side AB .
ד. Find the area of Trapezoid $ABCD$.



Probability and Statistics

5. For the summer vacation, a town council decided to hold a children's fair with 4 types of paid activities: watching a movie, an arts and crafts workshop, swimming in a pool, and a cooking workshop.

Each child who came to the fair bought a ticket for only one activity.

The table below shows ticket prices and the number of children who bought tickets for each type of activity.

Activity	Movie	Arts and crafts	Swimming	Cooking
Price per ticket (shekels)	15	30	55	60
Number of children	18	54	24	24

- א. (1) How many children in total bought a ticket for an activity at the fair?
- (2) Find the average price of a ticket bought by a child who came to the fair.
- ב. Which activity at the fair is the mode (the most popular) [שכיח]?
- ג. What percentage of all the children who attended the fair bought tickets for the arts and crafts workshop?

The council reduced the price of a swimming ticket by 10 shekels and raised the price of a cooking workshop ticket by 20% .

- ד. After the prices were changed, did the average price of a ticket that a child bought increase, decrease, or remain the same? Explain your answer.

6. The daily milk yield of cows on a certain dairy farm is normally distributed, and the average is 48 liters.

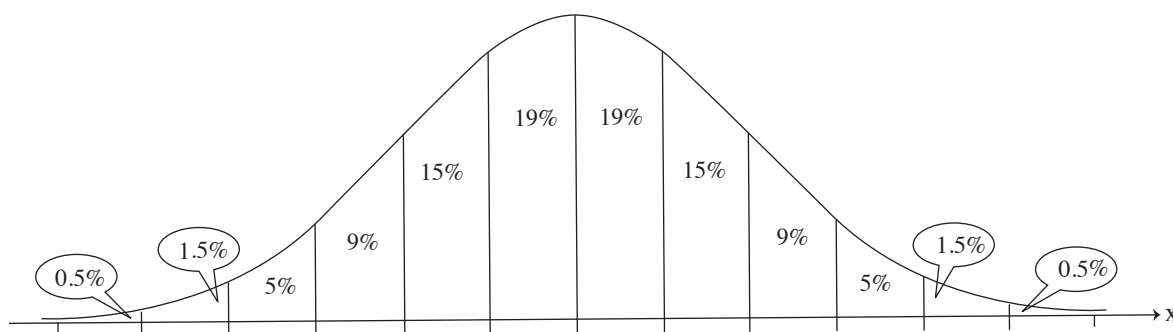
7% of the cows have a daily milk yield of less than 24 liters.

- א. Calculate the standard deviation of the daily milk yield of the cows on the farm.
- ב. What percentage of cows on the farm have a daily milk yield of more than 56 liters?
- ג. What percentage of cows on the farm have a daily milk yield of more than 24 liters and less than 56 liters?

There are 200 cows on the farm.

- ד. Based on the normal distribution curve, how many cows on the farm have a daily milk yield of more than 24 liters and less than 56 liters?

Below is the normal distribution curve from the formula sheet. Use it in your calculations.



Good Luck!

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בהצלחה!

זכות היוצרים שמורה למדינת ישראל
אין להעתיק או לפרסם אלא ברשות משרד החינוך