

Mathematics

3 Points — 2nd Exam

מתמטיקה

3 יחידות לימוד — שאלון שני

Instructions

א. Duration of the exam: One and a half hours

הוראות
א. משך הבחינה: שעה וחצי.

ב. Exam structure and breakdown of points:

This exam has six questions.

Each question is worth 25 points.

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

ב. מבנה השאלון ומפתח ההערכה:

בשאלון זה שש שאלות.

לכל שאלה — 25 נקודות.

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

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. Special instructions:

- (1) Write all of your calculations and answers in the Hebrew exam booklet.

Do not write in the shaded margins.

- (2) Explain all of your work, including calculations, in detail and in a clear and organized fashion.

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

- (3) For draft paper, use the pages in the **Hebrew exam booklet**. Use of other draft paper may lead to the disqualification of your exam.

ד. הוראות מיוחדות:

- (1) יש לכתוב את כל החישובים והתשובות בנוסח העברי של השאלון.

אסור לכתוב על הפסים שבשוליים.

- (2) יש להסביר את כל הפעולות, כולל חישובים, בפירוט ובצורה ברורה ומסודרת.

חוסר פירוט עלול לגרום לפגיעה בציון או לפסילת הבחינה.

- (3) לטייטה יש להשתמש בדפים שבנוסח העברי של השאלון. שימוש בטייטה אחרת עלול לגרום לפסילת הבחינה.

Note: At the end of the Hebrew exam booklet there is draft paper. Do not add any other pages.

שימו לב: בסוף הבחינה מצורפים דפי טייטה. אין להוסיף דפים אחרים למחברת הבחינה.

Good Luck!

בהצלחה!

Questions

This exam consists of six questions. A complete answer is worth 25 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.

Write all of your calculations and answers in the Hebrew exam booklet.

Algebra

1. The figure on the right shows the graphs of two functions:

$$f(x) = x^2 - 8x + 15,$$

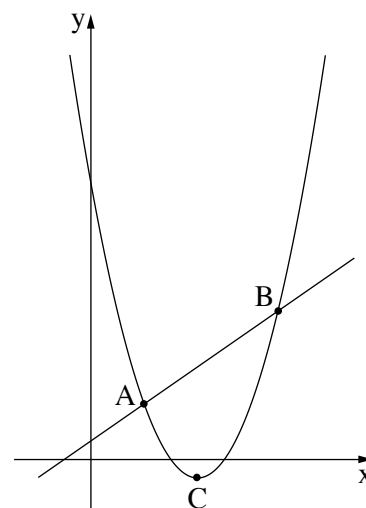
$$g(x) = x + 1.$$

One of the graphs is a parabola, and the other graph is a straight line.

- א. Which of the functions, $f(x)$ or $g(x)$, describes the parabola?
- ב. Find the coordinates of the vertex of the parabola, Point C.
- ג. Write the interval on which the parabola is increasing.

Points A and B are the intersection points of the parabola with the line, as shown in the figure.

- ד. Find the coordinates of Points A and B.



2. Noam wants to buy a smartphone that costs 2,000 shekels.

Yossi also wants to buy a smartphone at the same price.

Each of them must save 2,000 shekels to buy the phone.

They began to save on the same day.

Noam saved 180 shekels on the first day, and on each consecutive day he saved 20 shekels more than on the previous day.

Yossi saved 272 shekels on the first day, and on each consecutive day he saved 16 shekels less than on the previous day.

- א. How many shekels did Noam save on the third day?
- ב. On what day did Yossi save 192 shekels?
- ג. How many days after he began saving did Noam have the total sum needed to buy the phone?
- ד. When Noam had finished saving the sum needed to buy the phone, how many shekels did Yossi still need to save before he could buy the phone?

3. The Halahmania bakery sells *halla* [חלות] and cakes, so they prepare two types of dough: *halla* dough and cake dough.

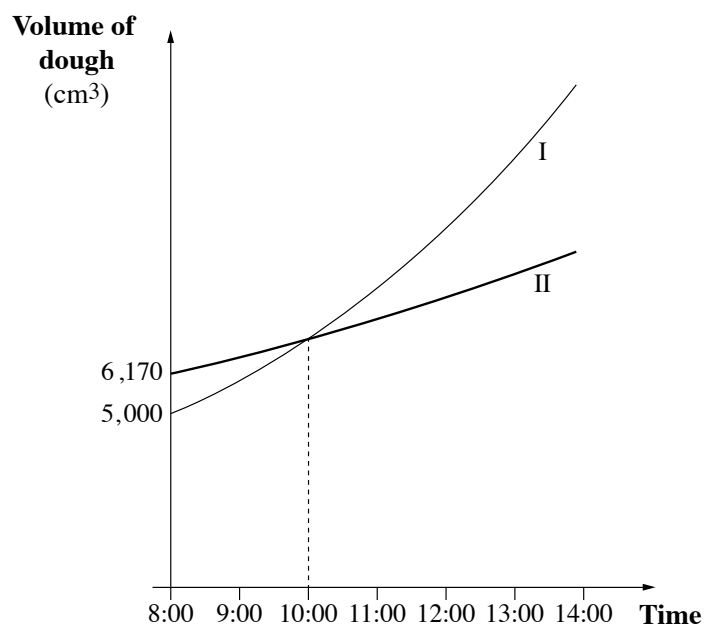
The volume of both types of dough increases exponentially.

Both types of dough began to rise at 8:00 .

At that time the volume of cake dough was greater than the volume of *halla* dough.

At 10:00 the volume of both types of dough was identical.

Graphs I and II in the figure below describe the volume of each of the types of dough by time.



- א. Which graph, Graph I or Graph II , describes the volume of *halla* dough?

- ב. According to the graph, what was the volume of *halla* dough at 8:00 ?

We know that the volume of *halla* dough increases every hour by 20% .

- ג. What was the volume of *halla* dough at 10:00 ?

- ד. By what percentage does the cake dough increase every hour?

- ה. What was the volume of cake dough at 13:00 ?

Trigonometry

4. The figure on the right describes a right pyramid, $SABCD$, whose base, $ABCD$, is a rectangle.

SO is the height of the pyramid.

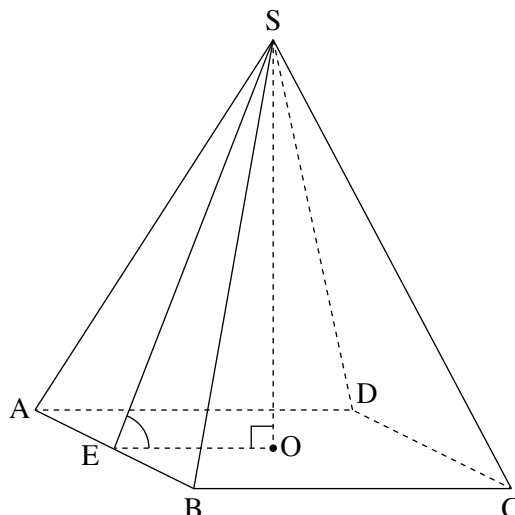
SE is the height to Side AB on Face SAB .

Given: $BC = 14$, $SO = 18$.

- א. (1) Find the length of Segment EO .
- (2) Calculate the length of Segment SE .
- ב. Calculate the size of the angle between the height SE and the pyramid's base.

Given: $SB = 20$.

- ג. Calculate the length of Side AB .
- ד. Calculate the volume of the pyramid.



Probability and Statistics

5. 40 families live in a certain village.

The table below shows the distribution of all the families in the village by the number of cars each family has.

Number of cars per family	0	1	2	3	4
Number of families	5	x	14	5	6

- א. How many families in the village have only one car?
- ב. What is the average number of cars per family in the village?

One family from the village is selected at random.

- ג. (1) What is the probability that the selected family does not have a car?
- (2) What is the probability that the number of cars that the selected family has is greater than the average number of cars per family?

Two new families moved into the village. One of these families has 3 cars, and the other family has 4 cars.

- ד. After these two families moved into the village, did the average number of cars per family increase, decrease, or remain the same? Explain.

6. The grades received by students on a nationwide exam have a normal distribution.

The average grade on the exam is 72, and the standard deviation is 8.

- א. What percentage of students received a grade lower than 64?
- ב. What percentage of students received a grade that was higher than the average and lower than 80?

25,000 students took the exam.

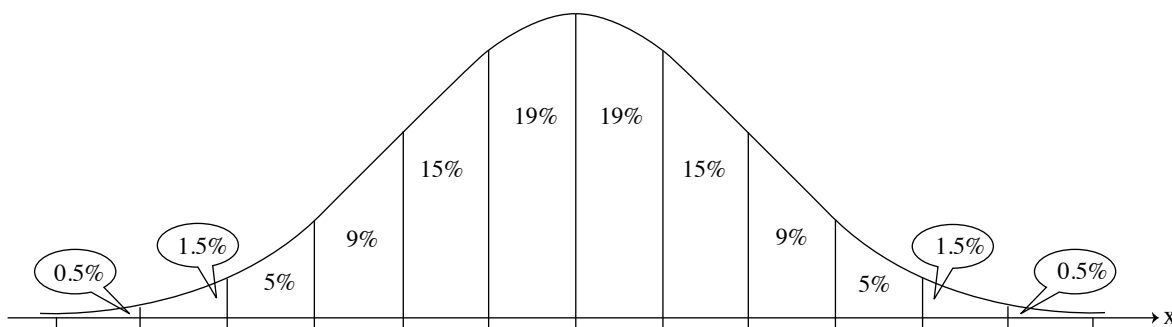
- ג. According to the normal distribution graph, how many students received a grade that was higher than the average and lower than 80?

The students with the highest grades in this exam received a commendation.

2% of the students received a commendation.

- ד. What is the lowest grade that qualifies a student to receive a commendation?

Below is the normal distribution graph 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