

Mathematics

3 Points — 2nd Exam

Instructions for examinees

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

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,
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) **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.

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

מ ת מ ט י ק ה

3 יחידות לימוד — שאלון שני

הוראות לנבחן

א. משך הבחינה: שעה וחצי.

ב. מבנה השאלון ומפתח ההערכה:

בשאלון זה שש שאלות.
לכל שאלה — 25 נקודות.
מותר לך לענות על מספר שאלות כרצונך,
אך סך הנקודות שתוכל לצבור לא יעלה על 100.

ג. חומר עזר מותר בשימוש:

- (1) מחשבון לא גרפי. אין להשתמש באפשרויות התכנות במחשבון הניתן לתכנות. 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) **כתוב את כל החישובים והתשובות בנוסח העברי של השאלון.**
אסור לכתוב על הפסים שבשוליים.
- (2) הסבר את כל פעולותיך, 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.

שים לב: בסוף הבחינה מצורפים דפי טייטה לשימושך.
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.

Note: Explain all of your work, including calculations, clearly and in detail.

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

Algebra

1. The figure on the right shows a parabola $y = x^2 - 8x + 16$.

The vertex of the parabola, C, is located on the x-axis.

- א. Find the coordinates of Vertex C.

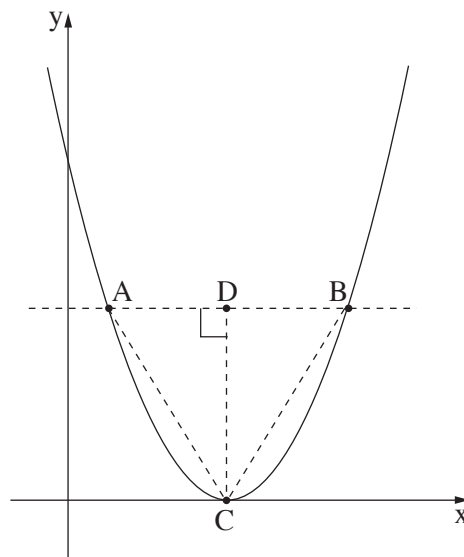
The line $y = 9$ intersects the parabola at

Points A and B as shown in the figure on the right.

- ב. (1) Find the coordinates of Points A and B.
(2) Find the length of Segment AB.

CD is the height to Side AB of Triangle ABC.

- ג. (1) Find the length of the height CD.
(2) Calculate the area of Triangle ABC.



2. Dina was preparing a fractions table [לוח שברים] for the math room.

The table below shows the first 4 columns and the first 5 rows of the fractions table.

The numbers in each row form an arithmetic sequence, and the numbers in each column also form an arithmetic sequence.

	Column 1	Column 2	Column 3	Column 4	...
Row 1	$\frac{1}{2}$	2	$3\frac{1}{2}$	5	...
Row 2	1	$2\frac{1}{2}$	4		...
Row 3	$1\frac{1}{2}$	3		6	...
Row 4	2	$3\frac{1}{2}$	5	$6\frac{1}{2}$	...
Row 5	$2\frac{1}{2}$	4	$5\frac{1}{2}$	7	...
⋮	⋮	⋮	⋮	⋮	

When Dina had finished working on the fractions table, water spilled onto it, and the numbers in two of the boxes were deleted.

- א. Fill in the numbers in the table that were deleted. Explain.
- ב. What number will appear in Column 4 in Row 13? Explain.
- ג. In which row in Column 1 will the number 6 appear?

3. Yeast cake dough must rise before being baked.

The volume of the dough rises exponentially.

The volume of the dough is checked every hour.

At 7:00 the volume of the dough was 2,000 cc.

At 10:00 the volume of the dough was 3,500 cc.

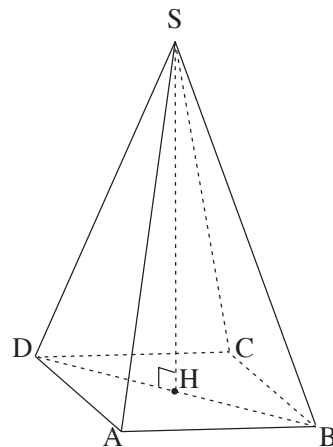
- א. During the rising process, by what proportion [פי כמה] does the volume of the dough increase hourly?
- ב. What will be the volume of the dough at 12:00?
- ג. At what time was the volume of the dough approximately 2,410 cc?

Trigonometry

4. The figure on the right shows a right pyramid SABCD, whose base ABCD is a rectangle. SH is the height of the pyramid.

Given: $AD = 6$ cm, $AB = 8$ cm, $SD = 15$ cm.

- א. Calculate the length of the diagonal of the base of the pyramid.
- ב. Calculate the length of the height, SH, of the pyramid.
- ג. Calculate the size of the angle between a side edge and the base of the pyramid.
- ד. Calculate the volume of the pyramid.



Probability and Statistics

5. A student took a math test and an English test.

The probability that he will pass the math test is 0.75, and the probability that he will pass the English test is 0.65.

- א. What is the probability that the student will pass both tests?
 - ב. (1) What is the probability that the student will pass the math test and not the English test?
(2) What is the probability that the student will pass only one of the two tests?
 - ג. What is the probability that the student will pass at least one of the two tests?
6. In a certain school the heights of the students have a normal distribution.
The average height of the students is 160 cm, and the standard deviation is 6 cm.
- א. What percentage of the students have a height of less than 157 cm?
 - ב. What percentage of the students have a height of between 157 cm and 172 cm?
- We know that the school has 536 students whose height is between 157 cm and 172 cm.
- ג. According to the normal distribution graph, how many students are there in this school?
- Below is the normal distribution graph from the formula sheet. Use it in your calculations.

