

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 30 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 to the exam booklet.

מתמטיקה

3 יחידות לימוד — שאלון שני

הוראות לנבחן

- א. משך הבחינה: שעה וחצי.
- ב. מבנה השאלון ומפתח ההערכה:
בשאלון זה שש שאלות.
לכל שאלה — 30 נקודות.
מוותר 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 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) **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 לשימוש. אין להוסיף דפים אחרים למחברת הבחינה.

Good Luck!

בהצלחה!

Questions

This exam consists of six questions. A complete answer is worth 30 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.

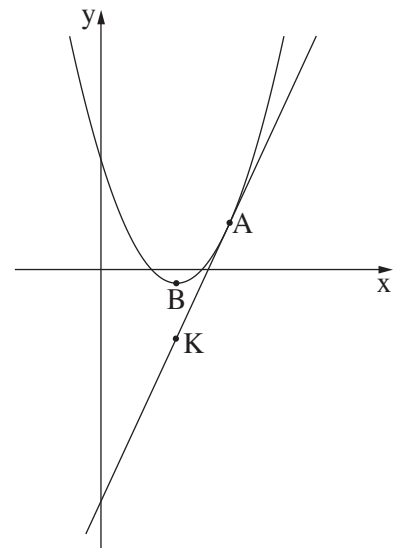
Algebra

1. Consider the parabola whose equation is $y = x^2 - 6x + 8$ and the line whose equation is $y = 4x - 17$ (see figure).
 - א. Find the coordinates of the vertex of the parabola (Point B in the figure).
 - ב. Find the interval on which the parabola is increasing and the interval on which the parabola is decreasing.
 - ג. Find the coordinates of the point that is common to the parabola and the line (Point A in the figure).

Point K is located on the line.

We know that the x-coordinate of Point K is the same as the x-coordinate of the vertex of the parabola.

- ד. Find the coordinates of Point K.



2. Roni went to the post office and mailed 4 packages. Each package had a different weight, and she bought a different stamp for each one.

The price of the stamp was determined by the weight of the package.

The prices of the stamps that Roni bought form an arithmetic sequence.

The price of the most expensive stamp was 3 times higher than the price of the cheapest stamp.

Roni paid a total of 96 shekels for the four stamps.

- א. How much did the cheapest stamp cost? How much did the most expensive stamp cost?
Show detailed calculations.
- ב. How much did each of the other two stamps cost? Show detailed calculations.

3. The quantity of a certain radioactive material decreases every hour by a fixed percentage.

A scientist measured the quantity of this material three times on the same day.

At 7:00 am there were 60 grams of material.

At 10:00 am there were 50 grams of material.

- א. By what percentage did the quantity of material decrease every hour?

At 4:00 pm (16:00) the scientist measured the quantity of this material for the third time that day.

- ב. How much material was there when the third measurement was made?

- ג. At what time were there about 44 grams of material?

Trigonometry

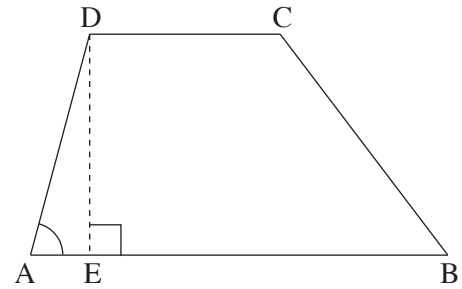
4. Consider Trapezoid ABCD ($AB \parallel CD$).

Given: $AD = 12$ cm, $DC = 8$ cm, $CB = 17$ cm,

$$\angle DAB = 75^\circ.$$

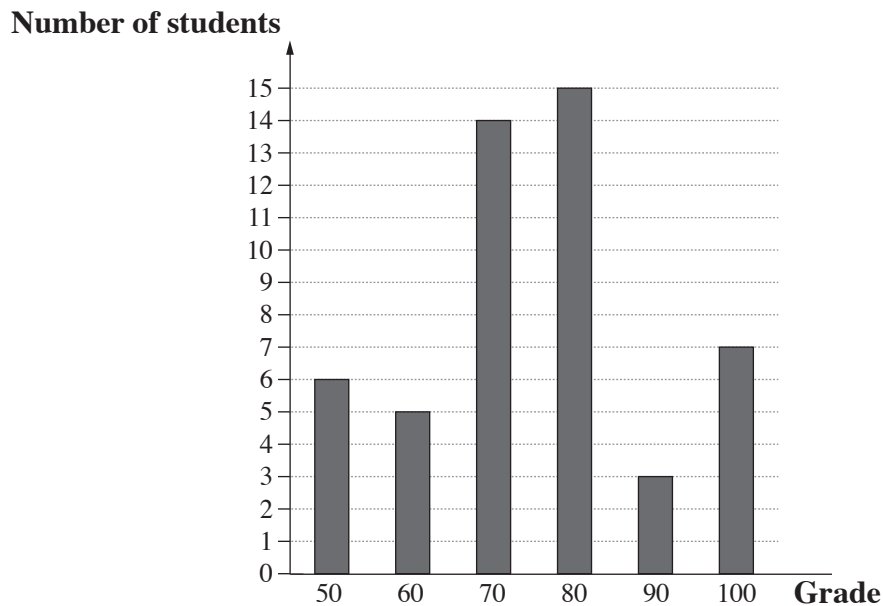
DE is a height of the trapezoid (see figure).

- א. Find the length of Segment AE .
- ב. Find the length of DE , a height of the trapezoid.
- ג. Find the length of the larger base AB .
- ד. Calculate the area of the trapezoid.
- ה. Find the size of the angle $\angle DBA$.



Probability and Statistics

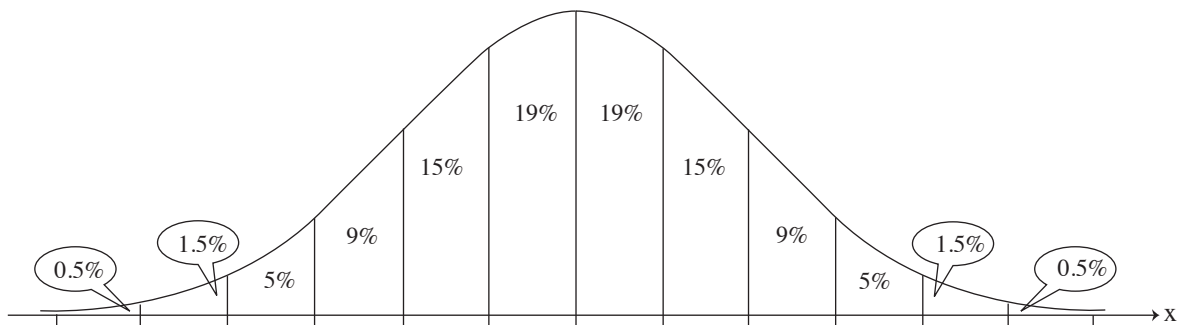
5. The bar diagram below shows the distribution of mathematics grades of all 10th grade students in City High School A.



- א. How many 10th grade students are there in City High School A?
- ב. Calculate the average grade in mathematics of the 10th grade students in City High School A.
- ג. A student who gains a grade over 89 is considered a top student.
A student is randomly selected from among the 10th grade students in City High School A.
What is the probability that the selected student is a top student?
- ד. One of the 10th grade students appealed his grade.
After the student's work was regraded, his grade increased by 20 points.
What is the new average grade of all the 10th grade students?

6. Students' grades on a nationwide exam have a normal distribution, with a standard deviation of 8 .
84% of the grades are lower than 75 .
- א. What is the students' average grade?
 - ב. The grade of one of the students who took the exam is selected at random.
What is the probability that the selected grade is lower than 55 ?
 - ג. 95,000 students took the exam. Based on the normal distribution graph, how many students gained a grade that is higher than 55 but lower than 75 ?
 - ד. The students with the highest grades pass with distinction.
It was decided that only 2% of the students would pass with distinction.
What is the lowest grade for which a student is entitled to pass with distinction?

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