

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, 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) **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.

מוותר לך לענות, באופן מלא או חלקי, 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 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.

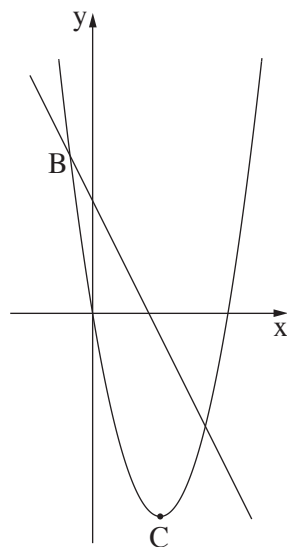
Write all of your calculations and answers in the Hebrew exam booklet.

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 to the right shows the parabola $f(x) = x^2 - 6x$ and the line $y = -2x + 5$.
 - א. Point C is the vertex of the parabola.
Find the coordinates of Point C.
 - ב. Point A is located on the parabola and its x-coordinate is 5.
Find the y-coordinate of Point A.
 - ג. (1) Show that Point A is located on the given line.
(2) The given line intersects the parabola at an additional point, B.
Find the coordinates of Point B.
 - ד. How many common points does the parabola have with the line $y = -9$? Explain.



2. In a contest offering money prizes, the prizes form an arithmetic sequence.

The first prize is the biggest, and each prize is worth 75 shekels less than the preceding prize.

In this contest all the prizes whose value was a positive number were awarded.

Tamar finished sixth in the contest and won the sixth prize : 625 shekels.

- א. How much was the first prize in the contest worth?
- ב. How much was the 11th prize in the contest worth?
- ג. Was a prize awarded to the person who came in 17th in the contest? Explain.
- ד. How many prizes were awarded in this contest? Explain.

3. On 1/1/2020 an agreement was signed with the workers of a certain factory. According to this agreement each worker would be given an annual salary increase of a fixed percentage (a different percentage for each worker).

On that date, Naama's monthly salary was 9,000 shekels.

Naama's salary rises by 2.5% annually.

- א. What will Naama's monthly salary be in five years' time (on 1/1/2025)?

On 1/1/2020 Yael's monthly salary was 8,000 shekels.

In three years' time (on 1/1/2023), Yael's monthly salary will be 9,261 shekels.

- ב. By what percentage will Yael's salary increase annually?
- ג. In five years' time (on 1/1/2025), whose monthly salary will be higher – Naama's or Yael's? Explain.

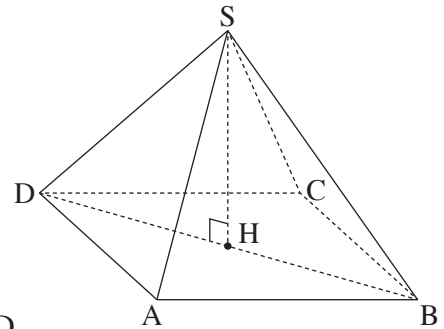
Trigonometry

4. SABCD is a right quadrilateral pyramid whose base, ABCD, is a rectangle.

SH is a height of the pyramid (see figure).

Given: $AD = 8$ cm, $AB = 12$ cm, $SH = 10$ cm.

- א. Calculate the length of the diagonal of the pyramid's base, DB .
- ב. Calculate the length of the side edge of the pyramid, SD .
- ג. Calculate the size of the angle between the side edge and the base of the pyramid.
- ד. Calculate the area of Triangle SDB .

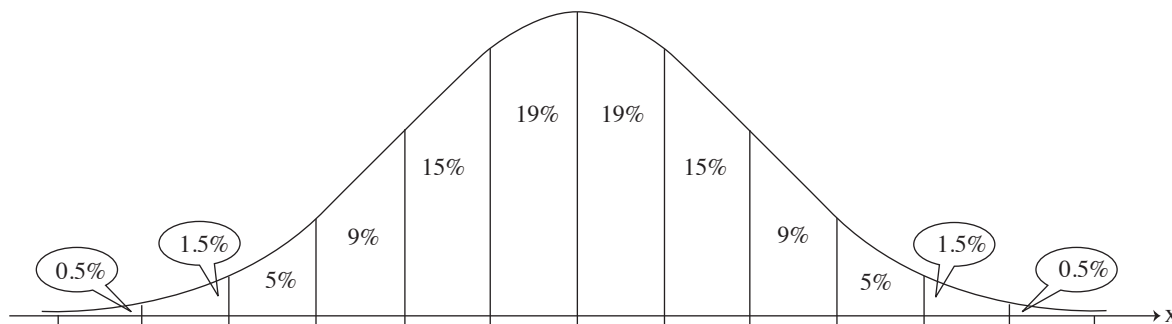


Probability and Statistics

5. The following is a list of seven grades: 91, 87, 85, 83, 81, 79, 75.
- א. Calculate the average of the grades in the list.
 - ב. Calculate the standard deviation of the grades in the list.
 - ג. Sagi claimed that if we add a grade of 84 to the list, the average grade will increase. Is he right? Explain.
 - ד. A grade was added to the list of seven grades, but the average grade remained the same. What grade was added? Explain.

6. The students' grades on a nationwide test have a normal distribution, with a standard deviation of 8.
- 69% of the grades are lower than 75.
- א. What is the average grade?
- ב. One of the grades is chosen at random.
What is the probability that the chosen grade is between 75 and 91?
- ג. 10,675 students gained a grade between 75 and 91 on the test.
Based on the normal distribution curve, how many students took the test?
- ד. It was decided that 7% of all the students (the students with the lowest grades) would take part in remedial classes.
Will a student with a grade of 54 take part in these remedial classes?

Below is a 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