

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: Two hours.

ב. Exam structure and breakdown of points:

This exam has six questions.

Each question is worth 28 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.

הוראות

א. משך הבחינה: שתיים.

ב. מבנה השאלון ומפתח ההערכה:

בשאלון זה שש שאלות.

לכל שאלה – 28 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.

Write in the answer booklet only. Write "טיטה" 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.

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

כתיבת טיטה בדפים שאינם במחברת הבחינה עלולה לגרום לפסילת הבחינה.

Good Luck!

בהצלחה!

Questions

This exam has six questions. A complete answer is worth 28 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. Consider the parabola $y = -x^2 + 2x + 15$.

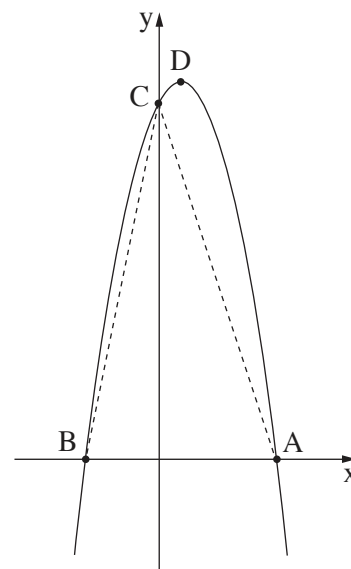
A and B are the points of intersection of the parabola with the x-axis, as shown in the figure.

Point C is the point of intersection of the parabola with the y-axis.

- א. Find the coordinates of Points A, B, and C.
- ב. Find the area of Triangle ABC.

Point D is the vertex of the parabola.

- ג. Find the coordinates of Point D.
- ד. Find how many points of intersection the line $y = 14$ has with the parabola.



2. Guy trains by running a track of a certain length. According to his training plan, every minute he needs to run a fixed number of meters more than he ran in the previous minute.

According to the plan, Guy needs to run 192 meters in the fourth minute and 264 meters in the tenth minute.

- א. How many more meters does Guy need to run every minute, compared to the previous minute?
- ב. How many meters does Guy need to run in the first minute?

According to the plan, Guy will run the entire track in exactly 15 minutes.

- ג. What is the length of the track Guy needs to run, according to his training plan?

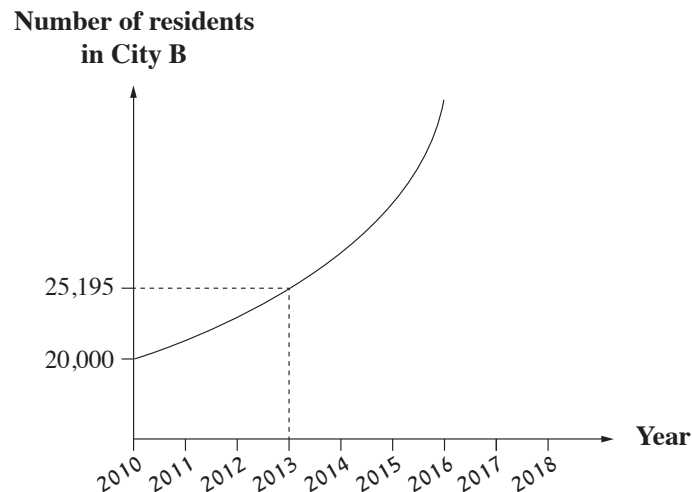
Guy started his run as planned, but stopped 1,500 meters before the end of the track.

- ד. Find how many minutes Guy ran.

3. The number of residents in City A increases by 6% every year.
- א. At the beginning of 2010 there were 24,000 residents in City A .
- (1) How many residents were there in City A at the beginning of 2015 ?
- (2) How many residents were there in City A at the beginning of 2008 ?

The number of residents in City B increases by a fixed percentage every year.

The graph below shows the number of residents in City B by year.



Use the graph to answer Items ב-ג below.

- ב. How many residents were there in City B at the beginning of 2013 ?
- ג. In which City, A or B , does the number of residents increase by a greater percentage every year? Explain your answer.

Trigonometry

4. In Rectangle ABCD, Point E is located on Side CD (see figure).

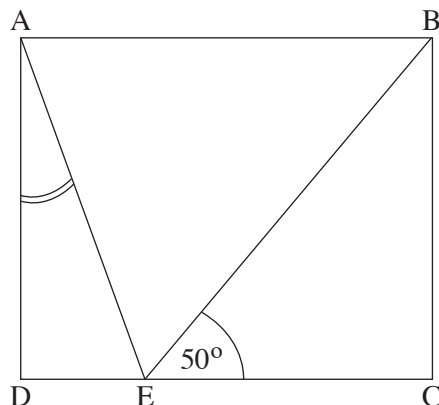
We know that the size of Angle BEC is 50° ,

$$EC = 14.$$

- א. Find the length of Segment BE.
- ב. Find the length of Side BC.

We know that $DC = 20$.

- ג. Find the size of Angle DAE.
- ד. Calculate the perimeter of Triangle AEB.



Probability and Statistics

5. There are 12 balls in a box. 9 of the balls are blue, and the rest are white.

- א. What is the probability of randomly drawing a white ball from the box?

We take one ball out of the box at random, return it to the box, and again take one ball out of the box at random.

- ב. What is the probability that both of the balls that were taken out were white?
- ג. What is the probability that both of the balls that were taken out were the same color?
- ד. What is the probability that at least one of the balls taken out was white?

6. The lifespan of batteries produced in a certain factory is normally distributed, with a standard deviation of 16 hours.

The lifespan of 7% of the batteries is greater than 221 hours.

- א. Find the average lifespan of a battery produced in this factory.
- ב. Find what percentage of batteries produced in this factory that last longer than 189 hours and less than 221 hours.

2% of the batteries produced in this factory, those with the shortest lifespan, are considered defective.

- ג. Find the lifespan of a battery, below which a battery is considered defective.

On a certain day this factory produced 108 defective batteries.

- ד. Based on the normal distribution curve, find the total number of batteries that were produced by the factory on that day.

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

