

Mathematics

3 Points — 2nd Exam

מתמטיקה

3 יחידות לימוד — שאלון שני

Instructions

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 Hebrew exam booklet there is draft paper. Do not add any other pages to the exam booklet.

הוראות

א. משך הבחינה: שעה וחצי.

ב. מבנה השאלון ומפתח ההערכה:

בשאלון זה שש שאלות.

לכל שאלה — 25 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) **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.

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.

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 a sketch of the parabola $y = -x^2 + 5x + 6$.

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

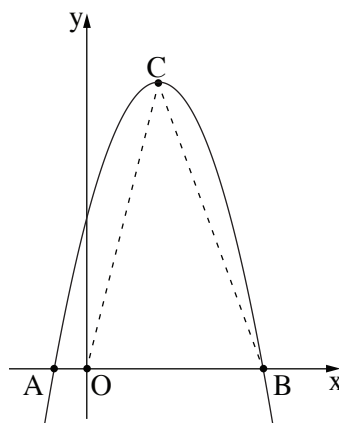
- א. Find the coordinates of Points A and B.

Point C is the vertex of the parabola.

- ב. (1) Find the coordinates of Point C.
 (2) Find the interval on which the parabola is decreasing.

Point O is the origin.

- ג. Find the area of Triangle BCO.



2. In a robotics competition several teams qualified for the final. They were ranked according to their achievements in the competition, and each team won a cash prize according to its final ranking: the team who ranked first won first prize in the competition, the team who ranked second won second prize, etc.

The prizes form an arithmetic sequence: the first prize has the highest value, and each of the subsequent prizes is smaller than the preceding prize by a fixed amount of shekels.

The team who ranked third won a prize of 1,400 shekels.

The team who ranked sixth won a prize of 950 shekels.

- א. Find the amount of the prize won by the team who ranked first.
 ב. The team in last place won a prize of 500 shekels.
 Find how many teams qualified for the final.
 ג. What was the total sum of the prizes awarded to all the teams that qualified for the final?

3. In a certain city the number of residents increases by 8% every year.

On 1.1.2010 a population census was conducted in the city and recorded 320,400 residents .

- א. Find how many residents were in the city 10 years after this census.
- ב. Find how many residents were in the city on 1.1.2000 .
- ג. Find in what year the city had approximately 403,612 residents.

Trigonometry

4. The figure on the right shows Rectangle ABCD .

E is a point on Side CD .

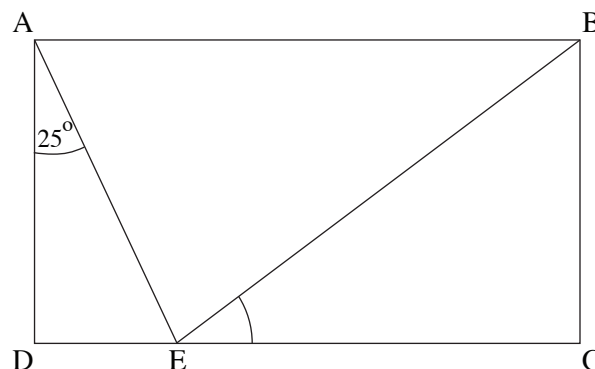
Given: $BC = 6$ cm.

$CE = 8$ cm.

- א. Find the length of the segment BE .
- ב. Find the size of the angle BEC .

Given: $\angle DAE = 25^\circ$

- א. (1) Find the length of the segment AE .
- (2) Calculate the perimeter of Triangle ABE .



Probability and Statistics

5. A spinner wheel is divided into six equal sections.

Each section displays one of the following numbers: 7 , 8 or 9 .

The number 7 is displayed on three sections, the number 8 is displayed on two sections, and the number 9 is displayed on one section, as shown in the figure on the right.

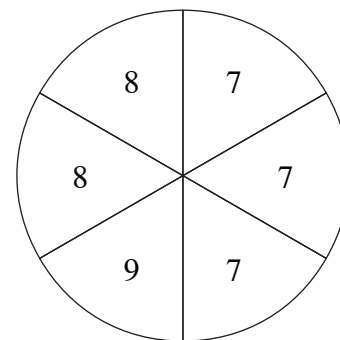
When the wheel is spun once, it randomly stops on one of the numbers (the wheel does not stop on the lines between sections).

The wheel is spun once.

- א. What is the probability that the wheel will stop on the number 9 ?
- ב. What is the probability that the wheel will stop on the number 8 ?
- ג. What is the probability that the wheel will stop on an odd number?

The wheel is spun twice.

- ד. What is the probability that the wheel will stop on the number 8 both times?
- ה. What is the probability that the sum of the two numbers on which the wheel stops will be 16 ?



6. In a group of boys, the boys' heights are normally distributed.

We know that 16% of the boys are taller than 182 cm, and 7% are shorter than 162 cm .

א. (1) Calculate the standard deviation of the boys' heights in this group.

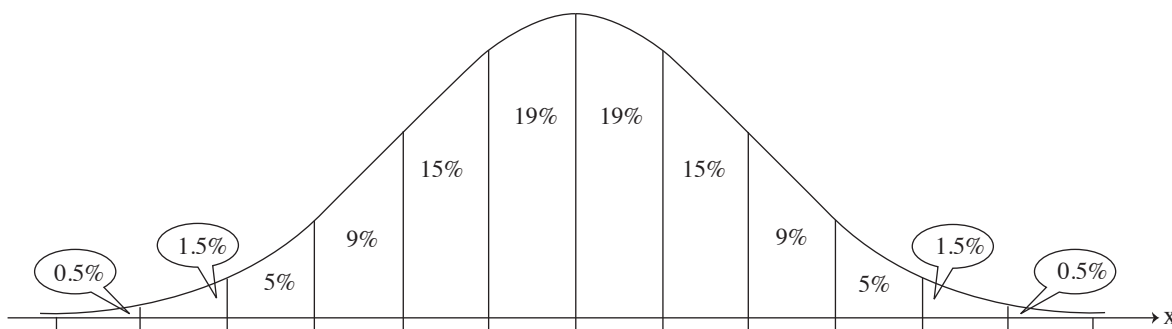
(2) Calculate the average height of the boys in this group.

ב. Find the percentage of boys in this group whose height is between 166 cm and 186 cm.

ג. We know that there are 300 boys in this group.

According to the normal distribution graph, how many boys in the group are taller than 166 cm and shorter than 186 cm?

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