The State of Israel
Ministry of Education
Exam Type: *Bagrut*
Exam Date: **Winter - Late**, 2021
Exam Number: 035381
Appendix: Formula sheets for 3 points
English Translation (3)

מועד חורף מאוחר

מדינת ישראל
משרד החינוך
סוג הבחינה: בגרות
מועד הבחינה: **חורף מאוחר** תשפ"א, 2021
מספר השאלון: 035381
נספח: דפי נוסחאות ל־3 יחידות לימוד
תרגום לאנגלית (3)

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. Do 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.**
If you use other draft paper your exam may be disqualified.

Note: At the end of the Hebrew exam there is draft paper. Do not add any other pages to the exam booklet.

Good Luck!

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.
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) לטיוטה יש להשתמש בדפים שב**נוסח העברי של השאלון**.
שימוש בטיוטה אחרת עלול לגרום לפסילת הבחינה.

שים לב: בסוף הבחינה מצורפים דפי טיוטה לשימושך. אין להוסיף דפים אחרים למחברת הבחינה.

בהצלחה!

Questions

This exam has 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.

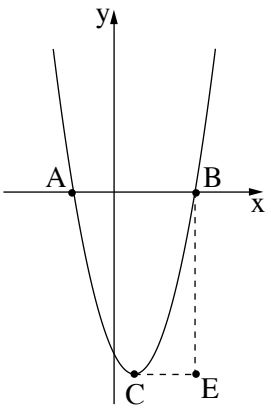
Write all of your calculations and answers in the Hebrew exam booklet.

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. Given: Function $f(x) = x^2 - 2x - 8$.

The function intersects the x-axis at Points A and B , as shown in the figure below.



א. Find the coordinates of Points A and B .

ב. Find the coordinates of the vertex of the parabola, C .

ג. A line parallel to the y-axis was drawn through Point B ,
and a line parallel to the x-axis was drawn through Point C .
The lines meet at Point E (see figure).

(1) Find the coordinates of Point E .

(2) Find the area of Triangle BCE .

2. The population of a certain city increases every year by 1.3% .
Every year, on January 1, a census is conducted in this city.
On January 1, 2010, the number of residents in the city was 500,000 .

א. What will the number of residents in the city be on January 1, 2040?

ב. What was the number of residents in the city on January 1, 2000?

ג. On January 1 of which year did the city have more than 525,000 residents for the first time?

3. In a geometric sequence whose terms are all positive, the third term is 3,840 and the fifth term is 6,000 .

א. Find the common ratio of the sequence.

ב. Find the first term in the sequence.

ג. Find the position in the sequence of the term 9,375 .

/Continued on page 3/

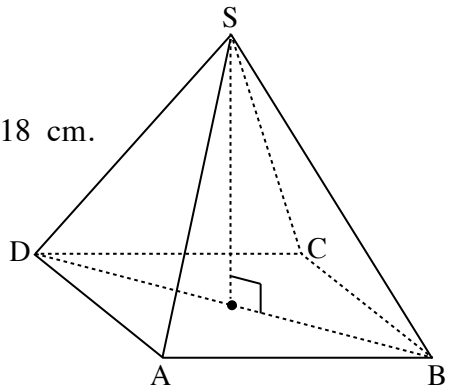
Trigonometry

4. Base ABCD of the quadrilateral right pyramid SABCD, is a rectangle (see figure).

Given: AD = 12 cm;

AB = 16 cm;

The length of SB, the side edge of the pyramid, is 18 cm.



א. Find the length of the diagonal of the pyramid's base.

ב. Find the angle between a side edge and the pyramid's base.

ג. Find the angle between the side edge SB and the side edge SD.

Statistics and Probability

5. These are the grades of five students: 77, 78, 79, 84, 87.

א. **(1)** Calculate the average of these students' grades.

(2) One of the five students was chosen at random. What is the probability that his or her grade was below the average?

ב. A sixth student's grade was added to the five grades. The average of the six students' grades is equal to the average that you calculated for Item א.

(1) What is the sixth student's grade?

(2) After the addition of the sixth student's grade, did the standard deviation increase, decrease, or remain the same? Explain.

/Continued on page 4/

6. The grades of students who took a national exam have a normal distribution with a standard deviation of 8 .

69% of the grades are higher than 61 .

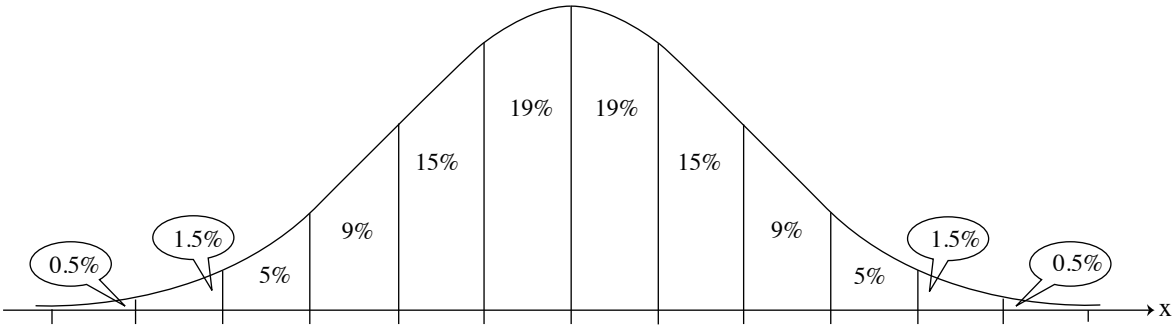
א. What is the average grade?

ב. What percentage of the students scored between 61 and 81 ?

ג. The number of students who scored between 61 and 81 in the national exam was 83,750 .

According to the normal distribution graph, how many students took the national exam?

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



Good Luck!

בהצלחה!