親愛的同事：

歡迎返回新學年。正如我在上個月的信中提到的，今年是數學改用新的標準化考試的第一年。我們將繼續開發綜合代數的新標準化考試（Regents Examination），並將於 2008 年 6 月首次執行。這次執行制度是將數學 A 和數學 B 考試轉變到綜合代數、幾何、代數 2/三角的第一步，這些轉變將在今後幾年內完成。

目前正在開發綜合代數的標準化考試，以便評估學生在數學學習標準與核心課程方面所取得的成績。本綜合代數標準化考試的考試樣本題包括考題的種類、格式和評分標準（scoring guides），這些內容目前正在開發過程中。樣本題還包括從實地試驗中挑選出來的學生答題示例。本考試樣本題可被印製與複製以用於課堂教學。

教育部對於紐約州教師參與各種課程指導能力的傳統感到驕傲。多年來，數以千計的教師與我們及代表紐約州各種學生群體的各種專業教育工作者們精誠合作，在為這項重要工作提供指導。

透過教育部網站上的誠徵專家（Call for Expertise）欄目，我們鼓勵教師們參與各項考試開發和標準設定工作。請從以下網址下載並填寫誠徵專家申請表：

http://www.emsc.nysed.gov/ciai/call.htm

謝謝您為紐約州學生所做的一切工作。

您忠實的，

David Abrams
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Integrated Algebra Sampler – Fall 07 iii
簡介

在 2005 年 3 月，教育部董事會 (Board of Regents) 已執行了一項新的數學學習標準並頒發了一套已修訂的核心課程，因此需要開發和執行三門新的數學標準化考試（Regents Examinations）：綜合代數、幾何及代數 2/三角。這些新的數學標準化考試將取代目前的數學 A 和數學 B 標準化考試。為了在畢業時達到數學標準化考試要求，學生必須通過這些新的畢業水準標準化考試中的任意一門。第一次進行標準化考試的時間表如下：綜合代數在 2008 年 6 月，幾何在 2009 年 6 月，代數在 2/三角 2010 年 6 月。數學核心課程 (2005 年修訂) 包含綜合代數標準化考試將基於的內容。

綜合代數標準化考試的考試樣本題提供了考題的格式及類型，實用手考將由這些類型的考題組成。樣本題中的評分標準 (scoring guide) 包括來自於實地試驗中的學生答題範例及每項回答所得的分數。

包括在考試樣本題中的參考頁 (reference sheet) 也將在實用手考中作為其一部分提供。必須提供尺子和圖形計算機，供每個學生在考試時單獨使用。學生不得使用能夠進行符號處理的計算機或能夠透過紅外線感測器與其他計算機通信的計算機。

樣本題可被複製，供您在課堂使用。
對學生的一般性指示

請回答本考試中的所有39道試題。考題中包括參考頁，在本考試中你可能需要參考頁來回答某些試題。

對於第一部份中的選擇題，錯誤答案不給分。請將你的答案寫在第一部份單獨的答題紙上提供的空欄內。

在第二、第三和第四部份，清楚地寫出必要的步驟，包括公式代換圖解、圖形和圖表等。對於這些部份的所有試題，不包含解題過程的正確數字答案只得1分。

如果用圖形計算機來回答第二、第三或第四部份的圖形試題，你應該表示以下每一項：

1) 視窗草圖
2) 在x和y軸上標明的尺度
3) 如果答案需要，清楚地標明x軸和y軸相交及交點
第一部份

請回答本部份的所有試題，每個正確的答案得 2 分。部份答案不給分。對每一道試題，請在單獨的答題紙上填寫最適合完成陳述或解答試題的字詞或短語前所列的號碼。[60]

1. 羅密歐紀錄了一份關於他在過去 10 天內每天聽音樂所花費的時間。下表顯示這些數據。

<table>
<thead>
<tr>
<th>天</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>小時</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

哪一幅找點圖以圖形方式表示了羅密歐的數據?

(1)  (3)

(2)  (4)
在歷史上，有很多人為數學的發展做出了貢獻。這些數學家包括畢達哥拉斯（Pythagoras）、歐幾裡得（Euclid）、海芭夏（Hypatia）、歐拉（Euler）、愛因斯坦（Einstein）、阿涅澤（Agnesi）、費布那西（Fibonacci）和帕斯卡（Pascal）。如果從上面列出的數學家名字中隨機選擇一個，那麼這個名字是以字母E開頭或是以字母A開頭的概率是多少？

(1) \(\frac{2}{8}\)  (2) \(\frac{3}{8}\)  (3) \(\frac{4}{8}\)  (4) \(\frac{6}{8}\)

哪一個表達式是代表\(\frac{2x^3(8x^5)}{4x^6}\)的最簡式？

(1) \(x^2\)  (2) \(x^9\)  (3) \(4x^2\)  (4) \(4x^9\)

下列哪一個區間記號代表包括從2到7的所有數字？

(1) (2,7]  (2) (2,7)  (3) [2,7)  (4) [2,7]

此方程式 \(ax + ay = a(x + y)\) 表示了哪種屬性？

(1) 結合性  (2) 交換性  (3) 分配性  (4) 恆等性
6 表達式 \(x^2 - 16\) 等同於

(1) \((x + 2)(x - 8)\)

(2) \((x - 2)(x + 8)\)

(3) \((x + 4)(x - 4)\)

(4) \((x + 8)(x - 8)\)


7 下面哪一種情況描述了**並非**因果關係的相關性?

(1) 公雞叫，太陽升。

(2) 駛用的哩程越多，需要的汽油就越多。

(3) 微波爐功力越大，食物熟的就越快。

(4) 跑步者跑得越快，達到終點就越快。


8 方程式 \(5x + 2y = 48\) 和 \(3x + 2y = 32\) 代表在兩次課堂時間銷售學校音樂會票所收集到的金額。如果 \(x\) 表示每張成人票的價格，\(y\) 表示每張學生票的價格，那麼每張成人票的價格是多少？

(1) \$20

(2) \$10

(3) \$8

(4) \$4
數據集 5、6、7、8、9、9、9、10、12、14、17、17、18、19、19 代表一個星期中數學班的學生在網絡上花費的小時數。下列哪一個盒鬚圖表示以上數據？

(1)

(2)

(3)

(4)

給定：
數集 \( A = \{(-2,-1), (-1,0), (1,8)\} \)
數集 \( B = \{(-3,-4), (-2,-1), (-1,2), (1,8)\} \).
數集 \( A \) 與數集 \( B \) 的交點是什麼？

(1) \{1,8\}
(2) \{(-2,-1)\}
(3) \{(-2,-1), (1,8)\}
(4) \{(-3,-4), (-2,-1), (-1,2), (-1,0), (1,8)\}
11 唐妮婭跑過一塊長方型場地的對角線，如下圖所示，這個場地長 40 碼，寬 30 碼。

![長方形場地對角線](image)

唐妮婭跑過的對角線長度是多少碼？
(1) 50  (2) 60  (3) 70  (4) 80

12 如下圖所示，一個圓柱形容器的直徑為 12 吋，高為 15 吋。

![圓柱形容器](image)

這個容器的體積是多少？請近似到立方吋的十分之一位。
(1) 6,785.8  (2) 4,241.2  (3) 2,160.0  (4) 1,696.5
13 下列哪一個是經過座標點（2,0）和（0,3）的直線的方程式?

(1) \( y = \frac{-3}{2}x + 3 \)  
(2) \( y = \frac{-3}{2}x - 3 \)  
(3) \( y = \frac{-2}{3}x + 2 \)  
(4) \( y = \frac{-2}{3}x - 2 \)

14 下列哪種情況應採用雙變數資料進行分析?

(1) 賽琳女士記有一份關於她的女兒在社會學功課上所花費時間的列表。
(2) 本傑明先生試圖瞭解他的學生所穿鞋子的尺寸是否與他們的身高直接相關。
(3) 德斯蒂芬先生記錄了他的客戶在夏季的最佳電玩遊戲分數。
(4) 程先生記錄他女兒該季的代數分數。

15 一家電子商品店出售 DVD 播放機和無線電話。這家商店每售出一台 DVD 播放機赚得 75 美元的利潤，每售出一部無線電話赚得 30 美元的利潤。這家商店希望從 DVD 播放機和無線電話的銷售中至少賺得 $255.00 美元的利潤。下列哪一個不等式說明瞭這種情況?

(1) \( 75d + 30c < 255 \)  
(2) \( 75d + 30c \leq 255 \)  
(3) \( 75d + 30c > 255 \)  
(4) \( 75d + 30c \geq 255 \)
16 包含點 (3,4) 和 (–6,10) 的直線的斜率是多少?

(1) \( \frac{1}{2} \)  
(2) 2  
(3) \(-\frac{2}{3}\)  
(4) \(-\frac{3}{2}\)

17 下圖所示的圖形是哪種類型?

(1) 絕對值  
(2) 指數  
(3) 線性  
(4) 二次函數
18 表達式 \( \frac{9x^4 - 27x^6}{3x^3} \) 等同於：

(1) \( 3x(1 - 3x) \)          (3) \( 3x(1 - 9x^5) \)
(2) \( 3x(1 - 3x^2) \)          (4) \( 9x^3(1 - x) \)

19 丹尼爾的印刷店購買了一台 35,000 美元的新打印機。它每年按 5% 的比率貶值（損失價值）。那麼它在第四年年底大約價值是多少？

(1) $33,250.00          (3) $28,507.72
(2) $30,008.13          (4) $27,082.33
20 下圖代表哪一個不等式?

(1) $y < 2x + 1$
(2) $y < -2x + 1$
(3) $y < \frac{1}{2}x + 1$
(4) $y < -\frac{1}{2}x + 1$

21 在三角形 $MCT$ 中，$\angle T = 90^\circ$, $MC = 85$ cm, $CT = 84$ cm, 並且 $TM = 13$ cm。下列哪一個比率代表 $\angle C$ 的正弦值?

(1) $\frac{13}{85}$
(2) $\frac{84}{85}$
(3) $\frac{13}{84}$
(4) $\frac{84}{13}$
22 下图为表示\(y = |x - 3|\)的图形。

下列哪幅图是表示\(y = -|x - 3|\)的图形？

(1)  (2)  (3)  (4)

用此空白做計算。
23 場地管理工將要更換美式足球場上的草坪。他測量的場地大小為 130 碼 × 60 碼。實際尺寸是 120 碼 × 54 碼。下列哪個表達式代表測量的相對誤差？

(1) \frac{(130)(60) - (120)(54)}{(120)(54)}
(3) \frac{(130)(60) - (120)(54)}{(130)(60)}

(2) \frac{(120)(54)}{(130)(60) - (120)(54)}
(4) \frac{(130)(60)}{(130)(60) - (120)(54)}

24 下列哪一個  x  值是不等式  –2x + 5 > 17  的解集?

(1) –8  (3) –4
(2) –6  (4) 12

25 什麼是 8.05 \times 10^6  與 3.5 \times 10^2  的商數？

(1) 2.3 \times 10^3  (3) 2.3 \times 10^8
(2) 2.3 \times 10^4  (4) 2.3 \times 10^{12}

26 一個長方型窗戶的長比寬 w 多 5 呎。該窗戶的面積是 36 平方呎。下列哪個方程式可用來求解窗戶的尺寸？

(1) w^2 + 5w + 36 = 0  (3) w^2 - 5w + 36 = 0
(2) w^2 - 5w - 36 = 0  (4) w^2 + 5w - 36 = 0
27 下列哪一項是以最簡式表示的 $\frac{d}{2}$ 與 $\frac{2d}{3}$ 的和?

(1) $\frac{3d}{5}$
(2) $\frac{3d}{6}$
(3) $\frac{7d}{5}$
(4) $\frac{7d}{6}$

28 下列哪一個 $x$ 值會使 $\frac{x - 3}{x^2 - 4}$ 沒有意義?

(1) $-2$
(2) $0$
(3) $3$
(4) $4$

29 下列哪一項文字表述表示 $2(n - 6)$?

(1) $n$ 的兩倍減去六
(2) 六的兩倍減去 $n$
(3) $n$ 減去六的數量的兩倍
(4) 六減去 $n$ 的數量的兩倍
30 下列哪一圖代表一個函數?

(1)  

(2)  

(3)  

(4)
第二部份

請回答本部份的所有試題。每個正確的答案得 2 分。清楚地寫出所有必要的步驟，包括適當的公式代換、圖形、圖表和作圖等。對於本部份的所有試題，不包含解題過程的正確數字答案只得 1 分。[6]

31 用最簡化的根式表示 $\sqrt[2]{72}$。

32 求解 $g$: $3 + 2g = 5g - 9$
賽麗娜的花園由一個長方型連接著一個半圓型而構成，如下圖所示。線段 $AB$ 是半圓型 $P$ 的直徑。賽麗娜希望在她的花園週圍安裝圍籬。

請計算賽麗娜所需要的圍籬的長度，接近到十分之一呎。
第三部份

請回答本部份的所有試題。每個正確的答案得 3 分。清楚地寫出所有必要的步驟，包括適當的公式代換、圖形、圖表和作圖等。對於本部份的所有試題，不包含解題過程的正確數字答案只得 1 分。[9]

34 漢娜去拜訪她的表妹。她開車 120 哩到她表妹的家，然後開相同的距離回家。

她花費 1.2 小時開了到她表妹家一半的路程。她的頭 1.2 小時行程的平均速度是每小時多少哩？

漢娜去她表妹家的剩餘路程的平均速度是每小時 40 哩，在剩餘的路程她開了多少小時？

回家時採用相同路線，漢娜開車的平均速度是每小時 55 哩。在 2 個小時之後她的車壞了。這時她離家還有多遠？
35 史密斯高中的一張畢業舞會票是 120 美元。為了賺錢買票，湯姆給鄰居溜狗，這樣每星期可賺 15 美元。如果湯姆已經存有 22 美元，那麼他至少還需要溜狗多少個星期才能賺得足夠的錢來支付畢業舞會票？

36 勞伯先生有三個孩子：兩個女兒（蘇和凱倫）及一個兒子（大衛）。在每餐之後，要隨機選定一個孩子刷洗盤碗。

如果同一個孩子可被選擇同時為午餐和晚餐刷盤洗碗，請構建一幅樹圖或一個樣本空間列表來表示誰將會在星期六午餐和晚餐後刷洗盤碗的所有可能性結果。

確定在星期六午餐和晚餐後由一個男孩和一個女孩刷盤洗碗的概率。
第四部份

請回答本部份的所有試題，每個正確的答案得4分。清楚地寫出所有必要的步驟，包括適當的公式代換、圖形、圖表和作圖。對於本部份的所有試題，不包含解題過程的正確數字答案只得1分。[12]

37 在華盛頓街11幢住房的價值如下表所示。

<table>
<thead>
<tr>
<th>每幢住房價值</th>
<th>住房數目</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,000</td>
<td>1</td>
</tr>
<tr>
<td>$175,000</td>
<td>5</td>
</tr>
<tr>
<td>$200,000</td>
<td>4</td>
</tr>
<tr>
<td>$700,000</td>
<td>1</td>
</tr>
</tbody>
</table>

求這些住房的平均美元價值。

求這些住房的中位數美元價值。

決定哪一個集中量數（平均值或中位數）能夠最佳地表示這11幢住房的價值。請證明你的答案。
在下面的座標軸上，圖解以下方程組，並寫出解集中各點的座標。

\[ y = x^2 - 6x + 5 \]
\[ 2x + y = 5 \]
39 求解 $x$ 的值:

$$\frac{x + 1}{x} = \frac{-7}{x - 12}$$
### 參考頁

<table>
<thead>
<tr>
<th>項目</th>
<th>公式</th>
</tr>
</thead>
</table>
| 三角比例 | \[
\sin A = \frac{對邊}{斜邊} \\
\cos A = \frac{鄰邊}{斜邊} \\
\tan A = \frac{對邊}{鄰邊}
\] |
| 面積 | 梯形 | \[A = \frac{1}{2}h(b_1 + b_2)\] |
| 體積 | 圓柱 | \[V = \pi r^2 h\] |
| 表面積 | 直角棱柱 | \[SA = 2lw + 2hw + 2lh\] |
| 圓柱 | \[SA = 2\pi r^2 + 2\pi rh\] |
| 座標幾何 | \[m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}\] |
草稿作圖紙 — 這張紙上的答案不計分。
草稿作圖紙 — 這張紙上的答案不計分。
The University of the State of New York

標準化高中考試
(REGENTS HIGH SCHOOL EXAMINATION)

綜合代數考試樣本題
2007 年秋季

d 答題紙

學生姓名 ......................................................... 性別： ☐ 男 ☐ 女 年級 ...........

教師姓名 ......................................................... 學校名稱 ...........................................

第一部份的答案必須寫在本答題紙上。

第一部份

回答本部份的所有 30 道題。

1 ................... 9 ................... 17 ................... 25 ...................

2 ................... 10 ................... 18 ................... 26 ...................

3 ................... 11 ................... 19 ................... 27 ...................

4 ................... 12 ................... 20 ................... 28 ...................

5 ................... 13 ................... 21 ................... 29 ...................

6 ................... 14 ................... 22 ................... 30 ...................

7 ................... 15 ................... 23 ................... ...................

8 ................... 16 ................... 24 ................... ...................

第二、第三和第四部份的答案應當寫在考題冊上。

當你完成考試後，必須在以下聲明中簽名。

本人在此考試結束時特此聲明，本人在考試之前未非法獲得考題或答案，在考試過程中回答所有問題時未向他人提供任何協助，亦未接受任何人的協助。

簽名

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Total Raw Score

Checked by

Rater’s/Scorer’s Name (minimum of three)
Scoring Guide for Integrated Algebra Test Sampler

Answers to multiple-choice questions 1 through 30, and the specific rubrics for open-ended questions 31 through 39, are provided on the following pages. A complete and correct student response is provided for each open-ended question. The response shows one example of how to solve the problem. In most cases there are other acceptable solutions. Other student responses are shown for each score level.

The maximum raw score for the Regents Examination in Integrated Algebra is allocated as follows:

<table>
<thead>
<tr>
<th>Part I</th>
<th>30 two-credit multiple-choice questions</th>
<th>60 credits</th>
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<tr>
<td>Part II</td>
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<tr>
<td>Part IV</td>
<td>3 four-credit open-ended questions</td>
<td>12 credits</td>
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PART I

|   | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---
PART II

(31) Express $5\sqrt{72}$ in simplest radical form.

Rubric

[2] $30\sqrt{2}$, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] Appropriate work is shown, but the answer is not in simplest radical form.

or

[1] $30\sqrt{2}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Student work – Score 2

\[
\begin{align*}
5\sqrt{72} & \\
& = 5 \cdot \sqrt{36 \cdot 2} \\
& = 5 \cdot 6 \sqrt{2} \\
& = 30 \sqrt{2}
\end{align*}
\]
Student work for Item 31 – Score 1

\[ 5\sqrt{72} \]
\[ \sqrt{a} \sqrt{b} \]
\[ \frac{1}{\sqrt{3}} \frac{1}{\sqrt{4}} \frac{1}{\sqrt{2}} \]
\[ 5 \cdot 3\sqrt{2} \]
\[ 15\sqrt{2} \]

4 - answer

Student work – Score 1

\[ 5\sqrt{72} \]
\[ 5\sqrt{9.8} \]
\[ 5\sqrt{9.8} \]
\[ 5.3\sqrt{2} \]
\[ 15\sqrt{2} \]

1, 4, 9, 16, 25, 36, 49
64, 81, 100
(32) Solve for \( g \): \( 3 + 2g = 5g - 9 \)

Rubric

[2] 4, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] 4, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Student work – Score 2

\[
\begin{align*}
3 + 2g &= 5g - 9 \\
+9 & \\
12 + 2g &= 5g - 2g \\
-2g & \\
12 &= 3g \\
\frac{12}{3} &= \frac{3g}{3} \\
4 &= g
\end{align*}
\]

check

\[
\begin{align*}
3 + 2(4) &= 5(4) - 9, \\
3 + 8 &= 20 - 9 \\
11 &= 11
\end{align*}
\]
Student work for Item 32 – Score 1

\[
\begin{align*}
3 + 2g &= 5g - 9 \\
+q & \quad \frac{+q}{-q} \\
12 + 2g &= 5g \\
-2g & \quad -2g \\
12 &= 3g \\
\frac{12}{12} & \quad \frac{12}{12} \\
.25 &= \frac{1}{4}
\end{align*}
\]

Student work – Score 0

\[
\begin{align*}
3g + 2g &= 5g - 9 \\
3 + 2 &= 5 \\
9 + 9 &= 9^2 \\
& \quad g = 0
\end{align*}
\]
Serena’s garden is a rectangle joined with a semicircle, as shown in the diagram below. Line segment $AB$ is a diameter of semicircle $P$. Serena wants to put a fence around her garden.

Calculate the length of fence Serena needs to the nearest tenth of a foot.

**Rubric**

[2] 33.4, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

*or*

[1] Appropriate work is shown, but one conceptual error is made.

*or*

[1] 33.4, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
Student work for Item 33 – Score 2

\[ \frac{3.14 \times 6}{2} = 18.84 \]

\[ 9.42 \times 9 = 84.78 \]

\[ \sqrt{84.78} \]

\[ 2 \times 18.84 \]

\[ 33.44 \text{ ft} \]

Student work – Score 1

\[ 14.13 \]

\[ \pi \times 2 \times 9 \]

\[ 9 + 9 + 6 + 14.13 = 38.13 \]
9 + 9 + 6 + 6 = 30 ft \text{ Semi-circle}

A \cdot C = \pi \cdot d
AC = \frac{\sqrt{18}}{2}
AC = 9.42 ft

39.4 ft of fence
PART III

(34) Hannah took a trip to visit her cousin. She drove 120 miles to reach her cousin’s house and the same distance back home.

It took her 1.2 hours to get halfway to her cousin’s house. What was her average speed, in miles per hour, for the first 1.2 hours of the trip?

Hannah’s average speed for the remainder of the trip to her cousin’s house was 40 miles per hour. How long, in hours, did it take her to drive the remaining distance?

Traveling home along the same route, Hannah drove at an average rate of 55 miles per hour. After 2 hours her car broke down. How many miles was she from home?
Rubric for Item 34

[3] 50, 1.5, and 10, and appropriate work is shown.

[2] Appropriate work is shown, but one computational error is made.

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] Appropriate work is shown, but two or more computational errors are made.

or

[1] 50, and appropriate work is shown, but no further correct work is shown.

or

[1] 1.5, and appropriate work is shown, but no further correct work is shown.

or

[1] 10, and appropriate work is shown, but no further correct work is shown.

or

[1] 50, 1.5, and 10, but no work is shown.

[0] 50 or 1.5 or 10, but no work is shown.

or

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
50 miles an hr \[ \times \frac{2.4}{100} \Rightarrow \frac{120}{1000} \Rightarrow 120 \text{ miles} \]

2.4 hrs \( \Rightarrow \frac{1.2}{120} \Rightarrow 1.2 \text{ hrs halfway} \)

1.2 hrs \( \Rightarrow \frac{60}{50} \Rightarrow 1.2 \text{ hrs} \)

50 miles \( \div \frac{1.2}{60} \Rightarrow 0 \text{ miles} \)

1.5 hrs \( \Rightarrow \frac{40}{3 \text{ hr trip}} \Rightarrow 1 \text{ hr trip} \)

120 miles Total \( \Rightarrow \frac{40}{8 \text{ miles}} \Rightarrow 8 \text{ miles} \)

120 \( \times 1.5 \Rightarrow \frac{200}{288} \Rightarrow 8 \text{ miles} \)

10 miles \[ \div \frac{2}{110} \Rightarrow \frac{120}{110} \Rightarrow 10 \text{ miles} \]
Student work for Item 34 – Score 2

\[
\frac{1.2 \text{ hrs}}{2.4} = 0.5 \text{ hrs.}
\]

\[
\frac{120}{2.4} = 50 \text{ mph}
\]

\[
\frac{60 \text{ remaining distance}}{40 \text{ mph}} = 1.5 \text{ hrs}
\]

5502 = 110 miles from home
Student work for Item 34 – Score 1

\[ \frac{120}{2} \]

\[ \frac{60}{2} \]

\[ 60 \text{ mph} \]

\[ 1.2 \]

\[ 20 \]

\[ 1.2 \]

\[ 12 \]

\[ 2.7 \text{ hours} \]

\[ 1.2 + \]

\[ 1.5 \]

\[ 2.7 \]

\[ 12 \]

\[ 40 \]

\[ \frac{60}{2} \]

\[ \frac{100}{2} \]

\[ 10 \text{ miles} \]

\[ \frac{1}{55} \]

\[ x 2 \]

\[ \frac{-110}{110} \]
\[ \frac{120}{2} = \frac{60}{1/2} = 30 \text{ min} \]

\[ 1 \frac{1}{2} \text{ hours} \]

10 miles
A prom ticket at Smith High School is $120. Tom is going to save money for the ticket by walking his neighbor’s dog for $15 per week. If Tom already has saved $22, what is the minimum number of weeks Tom must walk the dog to earn enough to pay for the prom ticket?

**Rubric**

[3] 7, and appropriate work is shown, such as solving the inequality $15x + 22 \geq 120$, solving an equation, or trial and error with at least three trials and appropriate checks.

[2] Appropriate work is shown, but one computational or rounding error is made.

or

[2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

[1] Appropriate work is shown, but two or more computational or rounding errors are made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] An incorrect equation of equal difficulty is solved appropriately.

or

[1] A correct inequality or equation is written, but no further correct work is shown.

or

[1] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.

or

[1] 7, but no work or only one trial with an appropriate check is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
Student work for Item 35 – Score 3

\[ \# 22 - \text{start} \]
\[ 57 - \text{week 1} \]
\[ 52 - 2 \]
\[ 67 - 3 \]
\[ 82 - 4 \]
\[ 97 - 5 \]

[Graph showing at least 7 weeks minimum]

\[ \# 120 \]
\[ \# 127 - 7 \]

Student work – Score 2

\[ \text{Let } x = \# \text{ of weeks} \]

\[ 15x + 22 \geq 120 \]

\[ \begin{align*}
   &15x + 22 \\
   &\quad \geq 120 \\
   &\quad -22 \\
   &\quad 15x \\
   &\quad \geq 88 \\
   &\quad \frac{15x}{15} \\
   &\quad \geq \frac{88}{15} \\
   &\quad \quad x \geq 5.86
\end{align*} \]

5 weeks would not be enough.

\[ 15(5) + 22 = 75 + 22 = 97 \]

He would have to walk the dog for 6 weeks.
Student work for Item 35 – Score 1

$15 p/w

$120 – 8 weeks
$105 – 7 weeks
$90 – 6 weeks

He already had $22

About 6 weeks

Student work – Score 1

7 weeks

No

2
Mr. Laub has three children: two girls (Sue and Karen) and one boy (David). After each meal, one child is chosen at random to wash dishes.

If the same child can be chosen for both lunch and dinner, construct a tree diagram or list a sample space of all the possible outcomes of who will wash dishes after lunch and dinner on Saturday.

Determine the probability that one boy and one girl will wash dishes after lunch and dinner on Saturday.

Rubric

[3] \( \frac{4}{9} \), and a correct tree diagram or sample space is shown.

[2] A correct tree diagram or sample space is shown, but no probability or an incorrect probability is given.

or

[2] An incorrect tree diagram or sample space is shown, but an appropriate probability is found.

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] \( \frac{4}{9} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
9 different out comes
Student work for Item 36 – Score 2

\[ \frac{4}{9} \]

Student work – Score 1
PART IV

(37) The values of 11 houses on Washington St. are shown in the table below.

<table>
<thead>
<tr>
<th>Value per House</th>
<th>Number of Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,000</td>
<td>1</td>
</tr>
<tr>
<td>$175,000</td>
<td>5</td>
</tr>
<tr>
<td>$200,000</td>
<td>4</td>
</tr>
<tr>
<td>$700,000</td>
<td>1</td>
</tr>
</tbody>
</table>

Find the mean value of these houses in dollars.

Find the median value of these houses in dollars.

State which measure of central tendency, the mean or the median, best represents the values of these 11 houses. Justify your answer.
Rubric for Item 37

[4] Mean = 225,000, median = 175,000, and the median is stated to be the best measure of central tendency, an appropriate justification is given, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made, but an appropriate measure of central tendency is stated, and an appropriate justification is given.

or

[3] Mean = 225,000, median = 175,000, and the median is stated to be the best measure of central tendency, but no justification is given.

[2] Appropriate work is shown, but two or more computational errors are made, but an appropriate measure of central tendency is stated, and an appropriate justification is given.

or

[2] Appropriate work is shown, but one conceptual error is made.

or

[2] Appropriate work is shown to find mean = 225,000 and median = 175,000, but no further correct work is shown.

[1] Appropriate work is shown, but one computational error and one conceptual error are made.

or

[1] Mean = 225,000 and median = 175,000, but no further work is shown.

[0] Mean = 225,000 or median = 175,000, but no further work is shown.

or

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
Student work for Item 37 – Score 4

\[ \frac{247,5000}{11} = 225,000 \]

\[ \text{Median} \geq 175,000 \]

\text{Median is best because only 1 house is higher than the mean!}

Student work – Score 3

\[ \frac{225,000}{11} \]

\[ \boxed{175,000} \]

122222233334

\[ \boxed{175,000} \] because it's in between the prices
The average or the mean best represents the values of these 11 losses because it shows the exact price of the average price, on the other hand the median just takes an estimate.
mean, average, median, mode, most occurring

$100,000$
$875,000$
$800,000$
$700,000$

The mean price of these houses in dollars

$18,750\times 5c = 18,750$

$618,750$.

$175,000$

is the median value of these houses.

The recurring central tendency of these 11 houses is $175,000$. 

\[ 100,000, 175,000, 175,000, 175,000, 175,000, 175,000, 200,000, 200,000, 200,000, 200,000, 200,000 \]
Student work for Item 37 – Score 1

$2,250,000

$1,750,000
(38) Solve the following systems of equations graphically, on the set of axes below, and state the coordinates of the point(s) in the solution set.

\[ y = x^2 - 6x + 5 \]
\[ 2x + y = 5 \]
Rubric for Item 38

[4] Correct graphs are drawn, and (0,5) and (4,−3) are stated.

[3] Both equations are graphed, but one graphing error is made, but appropriate solutions are stated.

or

[3] Both graphs are drawn correctly, but only one solution is stated.

[2] Both graphs are drawn correctly, but no solutions are stated.

or

[2] Both equations are graphed, but two or more graphing errors are made, but appropriate solutions are stated.

or

[2] Appropriate work is shown to find (0,5) and (4,−3), but a method other than graphing is used.

or

[2] Both equations are graphed, but one conceptual error is made.

[1] Both equations are graphed, but one conceptual error and one graphing error are made.

or

[1] (0,5) and (4,−3) are stated, but no work is shown.

[0] (0,5) or (4,−3) is stated, but no work is shown.

or

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
Student work for Item 38 – Score 4

\[
y = x^2 - 6x + 5
\]

\[
2x + y = 5
\]

\[
-2x
\]

\[
y = -2x + 5
\]

\[
\begin{array}{c|c}
 x & y \\
\hline
 0 & 5 \\
 4 & -3 \\
\end{array}
\]

\[
y = x^2 - 6x + 5
\]

\[
\begin{array}{c|c}
 x & y \\
\hline
 0 & 5 \\
 1 & 0 \\
 2 & -3 \\
 3 & -4 \\
 4 & -3 \\
 5 & 0 \\
\end{array}
\]

\[
y = -2x + 5
\]

\[
\begin{array}{c|c}
 x & y \\
\hline
 0 & 5 \\
 1 & 3 \\
 2 & 1 \\
 3 & -1 \\
 4 & -3 \\
 5 & -5 \\
 6 & -7 \\
\end{array}
\]
Student work for Item 38 – Score 3

\[ y = x^2 - 6x + 5 \]
\[ 2x + y = 5 \]
\[-2x \]
\[-2x \]
\[ y = 5 - 2x \]

Solution: \((5, 0) \ltimes (4, -3)\)
\[
\frac{2x + y = 5}{-2x} \quad \frac{2x}{y = 5 - 2x}
\]

\[
y = -x^2 + 6x + 5
\]
Student work for Item 38 – Score 1

\[ y = 5 - 3x \]
(39) Solve for $x$: \[ \frac{x+1}{x} = \frac{-7}{x-12} \]
Rubric for Item 39

[4] 6 and –2, and appropriate work is shown, such as an algebraic solution or trial and error with at least three trials and appropriate checks.

[3] Appropriate work is shown, but one computational or factoring error is made.

or

[3] Appropriate work is shown, but only one solution is found.


or

[2] Appropriate work is shown, but two or more computational or factoring errors are made.

or

[2] Appropriate work is shown, but one conceptual error is made.

or

[2] The trial-and-error method is used to find at least one solution, but only two trials and appropriate checks are shown.

or

[2] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.

or


[1] \( x^2 – 11x – 12 = –7x \), but no further correct work is shown.

or

[1] 6 and –2, but no work or only one trial with an appropriate check is shown.

or

[1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or

[1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.

[0] 6 or –2, but no work is shown.

or

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
\[(x-4)(x+2) = -7x\]
\[x^2 - 12x + x - 12 = -7x\]
\[x^2 - 11x - 12 = -7x\]
\[x^2 - 4x - 12 = 0\]

\[x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\]
\[x = \frac{4 \pm \sqrt{(4)^2 - 4(1)(-12)}}{2}\]
\[x = 4 \pm \sqrt{64}\]
\[x = 6, x = -2\]
Student work for Item 39 – Score 3

\[
\frac{x+1}{x} \cdot \frac{x-12}{x-12} = \frac{x-7}{x-12}
\]

\[
x + 7 \cdot x - 12 = x - 7
\]

\[
x^2 + 1x + 12x + 12 = -7x
\]

\[
x^2 - 11x - 12 = -7x
\]

\[
+7x
\]

\[
+7x
\]

\[
x^2 - 4x - 12 = 0
\]

\[
(x-6)(x+2) = 0
\]

\[
x-6=0 \quad x-2=0
\]

\[
+6 +6
\]

\[
+2 +2
\]

\[
x=6
\]

\[
x=2
\]
Student work for Item 39 – Score 2

\[(x+1)(x-12) = -7x\]
\[x^2 - 11x - 12 = -7x\]
\[+7x\]
\[+7x\]
\[x^2 - 4x - 12 = 0\]
\[(x - 4)(x + 3) = 0\]
\[x = 4 \text{ or } x = -3\]

Student work – Score 1

\[x - 7 = x + 1 + x - 12\]
\[x - 7 = 2x - 11\]
\[\frac{x}{x} - 7 = \frac{2x - 11}{x}\]
\[-7 = x - \frac{11}{x}\]
\[+11 = x + \frac{11}{x}\]
\[x = 4\]
APPENDICES
Appendix A

The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Albany, New York 12234

Specifications for the Regents Examination in Integrated Algebra
(First Administration–June 2008)

The questions on the Regents Examination in Integrated Algebra will assess both the content and the process strands of New York State Mathematics Standard 3. Each question will be aligned to one content performance indicator but will also be aligned to one or more process performance indicators, as appropriate for the concepts embodied in the task. As a result of the alignment to both content and process strands, the examination will assess students’ conceptual understanding, procedural fluency, and problem-solving abilities rather than assessing knowledge of isolated skills and facts.

There will be 39 questions on the Regents Examination in Integrated Algebra. The table below shows the percentage of total credits that will be aligned with each content strand.

<table>
<thead>
<tr>
<th>Content Strand</th>
<th>% of Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Number Sense and Operations</td>
<td>6–10%</td>
</tr>
<tr>
<td>2 Algebra</td>
<td>50–55%</td>
</tr>
<tr>
<td>3 Geometry</td>
<td>14–19%</td>
</tr>
<tr>
<td>4 Measurement</td>
<td>3–8%</td>
</tr>
<tr>
<td>5 Probability and Statistics</td>
<td>14–19%</td>
</tr>
</tbody>
</table>

Question Types

The Regents Examination in Integrated Algebra will include the following types and numbers of questions:

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Number of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple choice</td>
<td>30</td>
</tr>
<tr>
<td>2-credit open ended</td>
<td>3</td>
</tr>
<tr>
<td>3-credit open ended</td>
<td>3</td>
</tr>
<tr>
<td>4-credit open ended</td>
<td>3</td>
</tr>
</tbody>
</table>

Calculators

Schools must make a graphing calculator available for the exclusive use of each student while that student takes the Regents Examination in Integrated Algebra.
Appendix B

Map to Learning Standards

The table below shows which content strand each item is aligned to. The numbers in the table represent the question numbers on the test.

<table>
<thead>
<tr>
<th>Content Strand</th>
<th>Multiple-Choice Item Number</th>
<th>2-Credit Item Number</th>
<th>3-Credit Item Number</th>
<th>4-Credit Item Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Sense and Operations</td>
<td>5, 25</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algebra</td>
<td>3, 4, 6, 8, 10, 11, 13, 15, 16, 18, 19, 21, 24, 26, 27, 28, 29</td>
<td>32</td>
<td>35</td>
<td>39</td>
</tr>
<tr>
<td>Geometry</td>
<td>12, 17, 20, 22, 30</td>
<td>33</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Measurement</td>
<td>23</td>
<td></td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Probability and Statistics</td>
<td>1, 2, 7, 9, 14</td>
<td></td>
<td>36</td>
<td>37</td>
</tr>
</tbody>
</table>