

World 9-1 Fractions Review



1) Calculate. Ensure your answer is in lowest terms.

a) $\frac{2}{7} + \frac{3}{7} =$

b) $\frac{1}{5} + \frac{4}{5} =$

c) $\frac{1}{4} + \frac{1}{2} =$

d) $\frac{5}{6} - \frac{2}{3} =$

e) $\frac{2}{5} + \frac{2}{4} =$

f) $\frac{5}{9} - \frac{1}{3} =$

g) $\frac{2}{6} + \frac{3}{8} =$

h) $\frac{4}{5} - \frac{1}{7} =$

i) $1 - \frac{5}{6} =$

2) Calculate. Ensure your answer is in lowest terms.

a) $\frac{1}{5} \times \frac{3}{7} =$

b) $\frac{1}{2} \times \frac{1}{2} =$

c) $\frac{3}{5} \times \frac{3}{4} =$

d) $\frac{3}{8} \times \frac{4}{6} =$

e) $\frac{2}{7} \times \frac{7}{9} =$

f) $\frac{5}{6} \times \frac{6}{5} =$

g) $\frac{2}{3} \times \frac{5}{7} =$

h) $\frac{4}{9} \times \frac{3}{6} =$

i) $\frac{12}{10} \times \frac{1}{6} =$

3) Calculate. Ensure your answer is in lowest terms.

a) $\frac{1}{4} \div \frac{1}{2} =$

b) $\frac{3}{5} \div \frac{5}{3} =$

c) $\frac{5}{8} \div \frac{2}{3} =$

d) $2 \div \frac{1}{4} =$

e) $\frac{4}{6} \div \frac{4}{6} =$

f) $\frac{2}{3} \div 4 =$

World 9-2 Number of Outcomes



Basic Counting Principle: In any experiment involving several (n) steps,

$$\begin{array}{ccccccc} \text{Total \# of} & = & \text{\# of outcomes from} & \times & \text{\# of outcomes} & \times & \text{\# of outcomes from} \\ \text{outcomes} & & \text{step 1} & & \text{from step 2} & \dots & \text{step "n"} \\ & & & & & & \end{array}$$

- 1) Corey is teaching his little sister the basics about games of chance. He is teaching her about coin tosses. How many possible outcomes are there if he tosses the coin...
 - a) once?
 - b) twice?
 - c) three times?
 - d) six times?

- 2) Ms. Furlotte is planning the menu for the Prom. Students can choose one item from each option: two choices of salad, four choices of entrees, and three choices of dessert. How many different meal combinations are there?

- 3)
 - a) License plates from PEI have two letters, followed by 3 numbers. How many unique license plates can be made, assuming you can repeat letters and numbers?

 - b) License plates from New York state have three letters, followed by 4 numbers. How many unique license plates can be made, assuming you can repeat letters and numbers?

- 4) Max is playing a game that involves rolling a 6-sided die, and then drawing a "Chance" card from a deck of 15 cards. Assume each card is unique. How many different possible outcomes are there for Max's turn?

- 5) Shelby is randomly drawing three cards out of a standard 52-card deck. How many possible outcomes are there if...
 - a) She takes 1 card, puts it back in the deck, and repeats this process until she has drawn 3 cards.

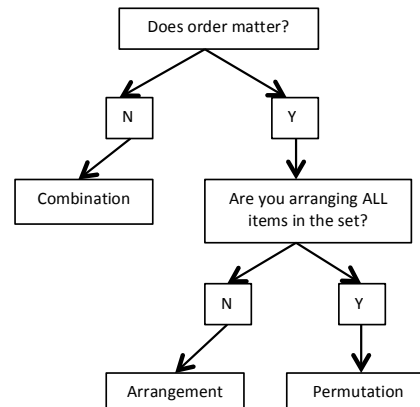
 - b) She draws one card at a time but does not replace any of them.

6) A die is rolled four times in a row. How many possible outcomes are there?

World 9-3 Arrangements, Permutations and Combinations

1) How many ways can Mrs. Cameron arrange her 7 pairs of black shoes in her front closet?

2) Every morning, Ms. Cameron must do any three of the following four exercises: running, biking, weights, and stretching. How different workout routines does she have if **a)** order does matter, and **b)** order doesn't matter?



3) To play a simple card game, Mr. Estabrook has to pick 5 cards randomly from a deck of 52 cards. The order of the cards in her hand is important. How many different hands can Mr. Estabrook possibly pick?

4) There are 8 people running for the Student Council election. The first place candidate will be president, the second-place candidate will be vice-president, and the third-place candidate will be secretary. How many different possible outcomes are there for the election?

5) When the Lotto 6-49 numbers are chosen, 49 labelled ping pong balls are placed in a drum, and 6 numbers are randomly drawn from the drum. How many possible 6-number combinations are there? (Note that order the numbers are picked isn't important.)

6) Using the digits 4, 5, 6, 7, 8, and 9, how many 5 digit numbers can you make without repeating the same digit?



World 9-4 Probability Definitions

Measuring Chance: The chance (or odds) of obtaining a certain outcome is the

Ex: An iPad is a prize in a raffle. Only 100 tickets are sold. What is the probability of winning if

You buy 1 ticket $P(1) =$

You buy 10 tickets $P(10) =$

Experiment: Situation that involves chance that leads to results or outcomes

Outcome: Result of a single trial of an experiment.

Random Experiment: An experiment in which the outcome(s) are independent of each other, and rely on chance.

Ex: Asking a stranger his/her favourite number, or drawing a card from a shuffled deck

Simple Event: A random experiment carried out in one step.

Ex: probability of rolling a 5?

$P(5) =$

Ex: Probability of picking the Ace of Spades?

$P(\text{Ace of Spades}) =$

Compound Event: A random event carried out in more than one step. Multiply both probabilities.

Ex: probability of rolling a 5 and then rolling a 2.

$P(5,2) =$

The Set of Outcomes: The set of all outcomes is a list of all possible combinations in a random experiment. This is sometimes called the *sample space*, or *universal set*, and we use the Greek symbol Ω to represent it.

Ex: Describe the set of all possible outcomes for flipping a coin: $\Omega = \{H, T\}$

Ex: Describe the set of all possible outcomes for rolling a die:

Ex: Describe the set of all possible outcomes for drawing a face card:

An Event: (a subset) Do *not* use the Ω symbol, since you are listing only some of the items in a set.

Ex: Rolling an even Number

The probability that this event occurs is the sum of the probabilities of its individual outcomes.



World 9-5 Probability Trees and Event Probability

A probability tree is a tool that is very helpful to organize and visualize all the possible outcomes of a compound experiment. The tree must contain the following elements:

- Each branch should be labelled, and the probability of that event should be written on the branch.
- The outcome of all compound events must be listed to the right of the tree
- The probability of each compound event must be listed to the right of the tree.

Example: Six marbles are placed in a jar. There are 4 blue marbles, and 2 red marbles. Two marbles are drawn with replacement. (This means that one marble is drawn, put back in the jar, and then another marble is drawn). Complete the probability tree that illustrates this experiment.

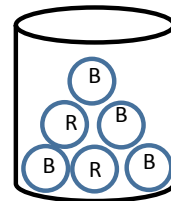
First draw	Second draw	Outcome	Probability
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Describe the set of outcomes:

Describe the event: "drawing one blue marble."

What is the probability of the outcome $P(R, R)$?



Probability: Events Problems

- 1) Write the set of all possible outcomes (i.e. sample space, or universal set) for the following:
 - a. Picking a day of the week at random.
 - b. Choosing your favourite grade at Symmes & D'Arcy.
 - c. Choosing a prime number smaller than 20.
 - d. Flipping a coin, twice.

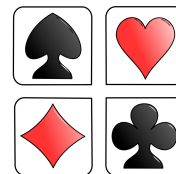
- 2) Three cards are placed face-down on a table: a Jack, a Queen, and a King. You must choose two cards without putting them back on the table.
 - a) Describe the set of all possible outcomes.

 - b) Describe the event: "getting one Queen".

 - c) Describe the event: "not getting a King". What is the probability of not getting a king?

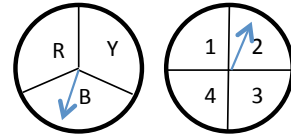
- 3) You roll a die twice.
 - a) Describe the event: "Rolling two even numbers", then calculate the probability of this event.

 - b) Describe the event: "Getting a 3 at least once", then calculate the probability of this event.



- 4) In a board game, you must spin two spinners, located on the right. One is a spinner that selects colour, (red, yellow, or blue) and one selects a number from 1 to 4.

a) Describe the set of outcomes.



b) What is the probability of getting (R, 4)?

c) Describe the event “getting Blue and an odd number”, and calculate the probability.

- 5) There are five cans of pop in the cooler: 3 colas, and 2 ginger ales. You choose two cans, at random, without replacement.

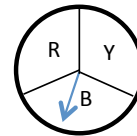
a) Complete a probability tree for this compound experiment.

First Pop	Second Pop	Outcome	Probability
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- | | |
|---|---|
| b) What is the probability of getting (C, G)? | c) Describe the event “choosing one can of cola.” |
|---|---|

- 6) Imagine spinning the spinner on the right, twice in a row.

a) Complete a probability tree for this experiment.



b) What can you conclude about the probability of each event?

World 9-6 The AND/OR's of Probability



When you want to calculate the probability of one event _____ another you _____ the probabilities of each individual event.

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- 1) A jar contains 12 blue, 3 red and 4 white marbles. What is the probability of drawing:
 - a) In 1 draw, either red or a white marble?
 - b) In 1 draw, either a red, white or blue marble?
 - c) In 2 draws, a white followed by a blue marble? (no replacement)
 - d) In 2 draws, either a red marble followed by a blue marble or a red marble followed by a red marble? (no replacement)

- 2) You have a standard deck of 52 cards. What is the probability of drawing:
 - a) In 1 draw, a Queen or a King?
 - b) In 1 draw, a diamond or a heart?
 - c) In 1 draw, the Ace of Spades or the King of Spades?
 - d) In 2 draws, without replacement, a Queen and then a King?
 - e) In 2 draws, without replacement, a diamond and then a heart?
 - f) In 2 draws, without replacement, the Ace of Spades and King of Spades, but the order doesn't matter?
 - g) In 3 draws, without replacement, three Kings in a row?

3) You roll two dice in a row. What is the probability of getting two numbers that add to...

a) five?

b) six?



c) seven?

d) three?

e) twelve?

f) one?

4) You are conducting a probability experiment with your friend. You have a jar with 12 identical marbles: 4 green, 3 red, and 5 blue. Your friend, wearing a blindfold, must take one marble from the bag, show you the colour so you can record it, and put it back in the bag. She then repeats this two more times for a total of three draws from the bag.

What is the probability that your friend chose...

a) 3 blue marbles in a row?

b) At least 2 green marbles?

c) At most 2 red marbles?

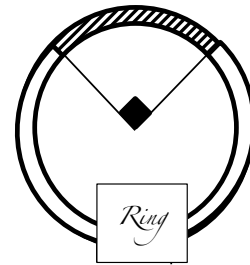
5) Fifteen students Grade 9 students were on the Honour Roll all three terms. There were 9 girls, and 6 boys. Student Council is awarding three trips to Calypso Water Park for three of the Honour Roll students, to be chosen at random out of a hat, without replacement.

What is the probability that at least two girls are chosen? Show all work

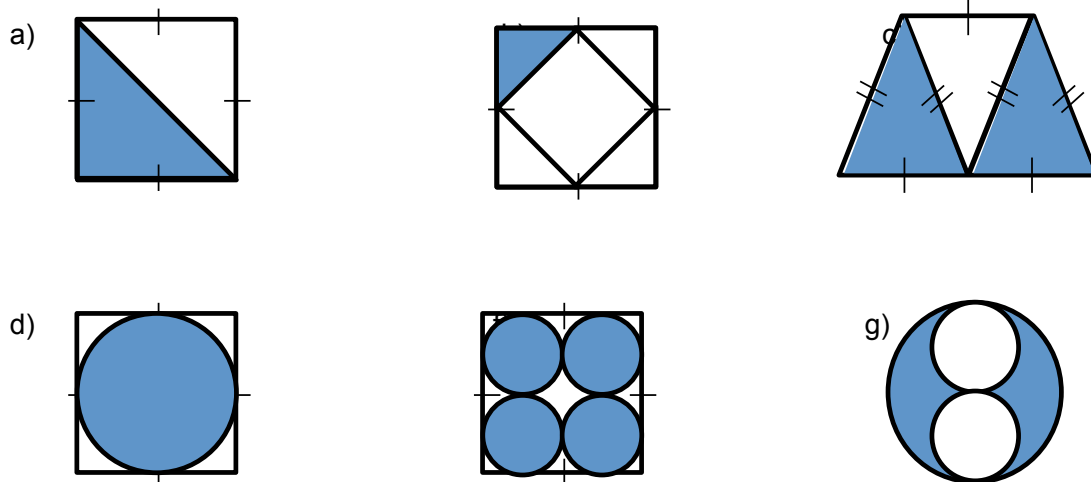
World 9-7 Geometric Probability

1) A clothesline in your backyard is 4m long. It snapped in a big windstorm over the weekend. What is the probability that it snapped 0.5 metres from either end of the line?

2) The Ring of Fire is a type of roller coaster that takes riders on a 360° ride around the inside of a circular track. The track is vertical, so the riders will go upside-down once per circuit. The ride will stop at random to give the riders an extra scare. What is the probability that you will stop in the top section of the track, as indicated in the diagram?

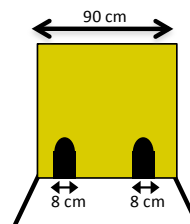


3) You throw a dart at each target, and you are guaranteed to hit the target. What is the chance your dart hits a shaded zone?

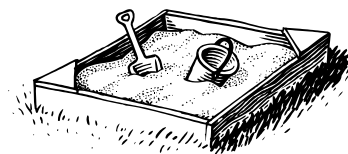


- 4) The drive from Aylmer to Montreal is approximately 220 km via Hwy 50. In the summer time, there are 12 construction zones along the highway to fix potholes. Each construction zone is 1500 m in length. At one point in your drive your Mom calls, so you have to stop the car and pull over to answer the phone. What is the chance that you stop in a construction zone?

- 5) A blind mouse is scurrying around an old barn. There are two mouse-holes in the wall, as shown. The mouse hears something approach, so he starts running toward the wall. If the mouse randomly runs toward the wall what is the chance that he will escape through a hole?

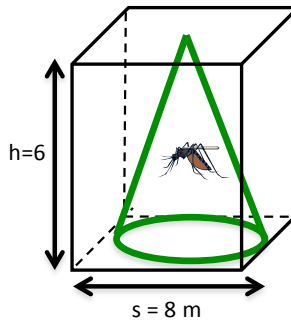


- 6) You have buried a small treasure in Nathan's rectangular sandbox for him to find. The sandbox is 15 cm high, and the width and length of the sides is 120 cm. He takes his cylindrical bucket - cylindrical in shape with height of 20 cm, and a diameter of 18 cm - and he takes a full scoop of sand out of the sandbox.

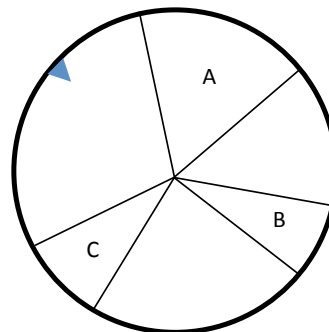


What is the probability that Nathan found the treasure with his first scoop? Show all work.

- 7) Jeff built a special laser-zapper so he could enjoy more patio time in the summer without mosquitoes. The zapper is inside a square-based prism, as shown on the right. The mosquito must fly into the cone-shaped zone to get trapped. The cone is the same height as the prism, and its diameter is the same width as the base. What is the probability that a mosquito that randomly flies into the prism will get trapped by the zapper? Show all work.



- 8) Kate is asked to design a “Wheel of Fortune”- style game for her school’s Winter Carnival. The total area of the wheel is 100 dm^2 . Sectors A, B, and C on the wheel (right) make up 45 dm^2 . The area of Sector A is twice as large as Sector B, and the area of Sector C is 10 dm^2 less than Sector A.

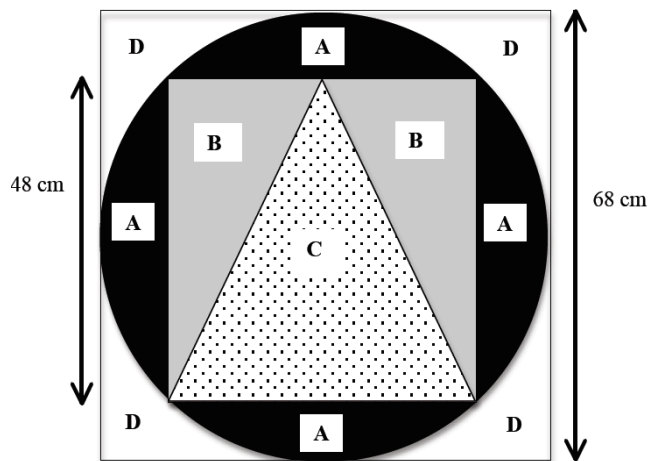


If you spin the wheel twice, what is the chance of landing on Sector C twice in a row? Show all work.

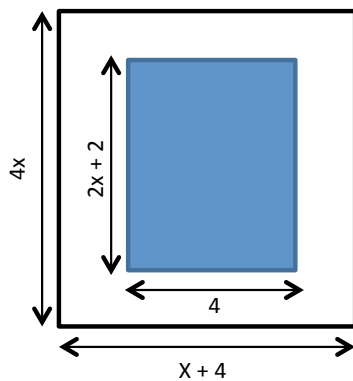
- 9) The dartboard shown below consists of a square panel inscribed with a circle, a square, and a triangle. Points are awarded to each person based on whether they land in area A, B, C or D.

Assuming a dart is randomly thrown and lands on the dartboard:

- What is the probability that a dart will land in area C?
- What is the probability that a dart will land in area A?
- What is the probability that a dart will land in area B or D?



- 10) The probability of hitting the shaded area in the target below is $\frac{1}{2}$. What is the height of the shaded rectangle?



Student Name _____

Criteria 1	0	8	16	24	32	40	Total
Criteria 2	0	8	16	24	32	40	
Criteria 3 & 4	0	4	8	12	16	20	

SITUATIONAL PROBLEM: #10
THE SKYDIVER



Jiuana Jumpa the famous Mexican skydiver is planning his newest dive.

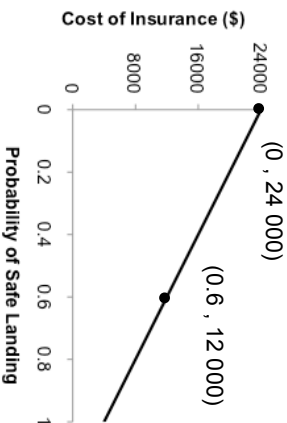
He is going to jump off of a skyscraper towards a tiny landing platform. Jiuana has three designs for landing platforms. Each platform has a zone where he can land safely (shaded region) and areas where he may not be so lucky (white regions).

After having a few accidents in his past stunts, Mr. Jumpa has had trouble finding a company that is willing to insure him. The cost of insurance from two "legitimate" companies is shown below.

We R' Desperate Insurance

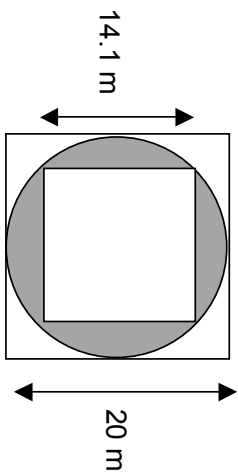
Probability of Safe Landing	Cost of Insurance (\$)
0.1	23 600
0.4	16 400
0.7	9 200

Break a Leg Accidental Insurance



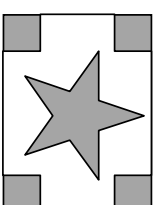
The cost of insurance depends on the probability of landing safely. Mr. Jumpa wants to do the riskiest stunt. (The one with the lowest probability of a safe landing).

Landing Platform A:



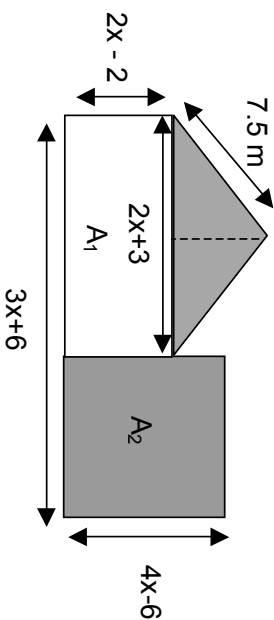
Landing Platform B:

- The cost of insurance for landing on this target happens to be the same for both companies.



Landing Platform C:

- Rectangle A_1 and A_2 have equal areas.



- Which landing platform should he choose?
- Which insurance company should he go with to pay the least amount of money?

Practice Test #5 Probability

Name: _____

Date: _____

PART A: Multiple Choice write the correct letter in the space provided 2 marks each

____ 1) A jar contains 3 red marbles, 2 blue, and 1 green. You reach in and take out one marble. What is the chance of taking out a red marble or a blue marble?

- a) $\frac{1}{6}$ b) $\frac{1}{3}$ c) $\frac{5}{6}$ d) 1

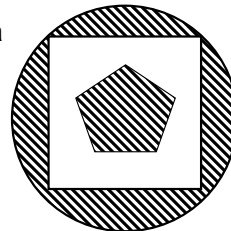
____ 2) The school cafeteria is offering a lunch special where you can choose one option from of each of the following: 3 entrees (salad, stir-fry, or sandwich), 2 drinks (milk or juice), and 3 desserts (fruit cup, jello, or yogurt). How many different lunch combinations are there?

- a) 2 b) 6 c) 8 d) 18

____ 3) What is the probability of picking out 3 kings in a deck of 52 cards? Each time a card is drawn it is replaced.

- a) $\frac{1}{2197}$ b) $\frac{3}{52}$ c) $\frac{8}{2704}$ d) $\frac{3}{1260}$

____ 5) What formula can be used to describe the probability of a dart randomly landing in a shaded zone on this dart board assuming that it must hit the board?



- a) $\frac{A_{circle} - A_{pentagon}}{A_{circle}}$ b) $\frac{A_{pentagon}}{A_{circle}}$ c) $\frac{A_{circle} - A_{square} + A_{pentagon}}{A_{circle}}$ d) $\frac{A_{circle}}{A_{total}}$

PART B: Short Answer *write the correct answer in the space provided 2 marks each*

5) How many different permutations can be made for a licence plate with 4 letters followed by 3 numbers allowing for repeats?

6) The D'Arcy hockey team is participating in a tournament this weekend. The tournament has a total of 8 teams. Medals will be given out to the 1st, 2nd, and 3rd place teams. How many ways are there to award the three medals among the 8 teams?

7) The Aylmer Bulletin has room for photos of only 5 of the 8 teams on their sports page. How many different combinations of teams does the photographer have to choose from if the order on the page doesn't matter?

8) What is the probability of rolling a 5 three times in a row?

9) What is the probability of rolling a sum of 7 using two dice?

10) Erin is planting three flowers on her deck. The possible colours for each flower are either red, or yellow. **Describe the sample space for the three flowers:**

$\Omega = \{ (\quad , \quad , \quad),$

PART C: Long Answer *show all of your work. Part marks are awarded 10 marks each*

11. MMMM CHOCOLATE

Mr. Proulx is trying to give away the last of his chocolate that he ordered for a basketball fundraiser. He has 5 boxes of chocolate almonds, 3 milk chocolate bars, and 1 box of mints in his cart. He randomly grabs one of the bars, throws it at Mr. Beauchamp, and then randomly grabs another one for himself.

a) Construct and complete a probability tree to illustrate the above situation.

1st choice

2nd choice

Outcomes

Probability

b) What is the probability that Mr. Proulx took a box of chocolate almonds, and then a milk chocolate?

c) What is the probability that Mr. Proulx took at least one box of chocolate almonds?

12. BBQ At D’Arcy

The D’Arcy teachers are holding a big barbecue lunch for the graduating students on the last day of exams. Mrs. Cameron has a big envelope full of food tickets that she has to give away to the students.

There are twice as many hot dog tickets as there are hamburger tickets. The number of veggie burger tickets is ten less than the number of hamburger tickets. There are 70 tickets, in total.

If you randomly choose three tickets, one after another, what is the probability of...

- a) Getting three veggie burgers?
- b) Getting one veggie burger, and then one hot dog, and then one hamburger?
- c) Getting at least two hot dogs?

Uses mathematical reasoning							
		Observable indicators correspond to level					
Evaluation Criteria	LEVEL	A	B	C	D	E	
	Cr. 3	40	32	24	16	8	0
	Cr. 2	40	32	24	16	8	0
	Cr. 4	20	16	12	8	4	0
	Cr. 5						

13. E.T. CARTRIDGES PHONE HOME

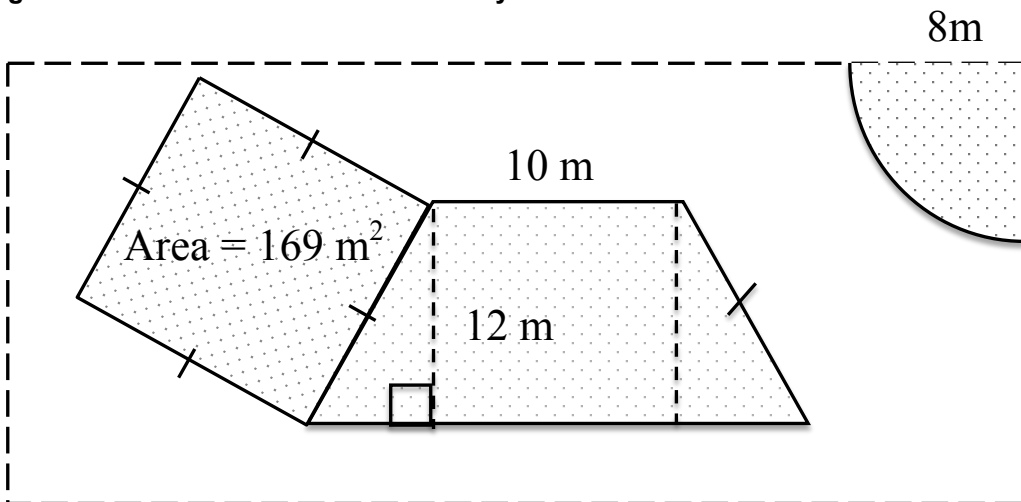
In 1983 thousands of unsold E.T. video game cartridges were buried in New Mexico under a pile of concrete. Recently an archaeological team discovered the location of this buried tomb in the desert. The diagram below shows the view from above of the digging site.

The shaded zones are where the video games can be found. The shapes are

- A square with area 169 m^2
- An isosceles trapezoid with height 12 m and one of the bases is 10 m
- A quarter of a circle with a radius of 8 m

The length around the dig site has a perimeter of 120 m . The length is twice the width.

A digger says the probability of randomly digging at the site and finding the games is 50%. Is he correct? Show all your work.



Uses mathematical reasoning							
		Observable indicators correspond to level					
Evaluation Criteria	LEVEL	A	B	C	D	E	
	Cr. 3	40	32	24	16	8	0
	Cr. 2	40	32	24	16	8	0
	Cr. 4 Cr. 5	20	16	12	8	4	0

14. COLD REFRESHMENTS

Ms. Cameron is having a BBQ and everyone is invited, however the cooler is almost empty. The beverage cooler contains 2 'orange crushes' 4 'lemonades' and 3 'cokes'.

- a) Use a probability tree to show the odds of picking one can, drinking it, then choosing another and can and drinking it.
- b) What is the probability of a student picking two 'orange crushes?'
- c) What is the probability of picking no cokes?

Uses mathematical reasoning							
		Observable indicators correspond to level					
Evaluation Criteria	LEVEL	A	B	C	D	E	
	Cr. 3	40	32	24	16	8	0
	Cr. 2	40	32	24	16	8	0
	Cr. 4 Cr. 5	20	16	12	8	4	0