



BEHIND THE SCREEN:
NEURODEVELOPMENT

BEHIND EXCESSIVE

SCREEN TIME



Lethbridge School Division Digital Wellness

WHAT DO YOU:



See - THINK - Wonder



Students, write your response!

Do you believe as a society (we) are addicted to our devices, and if so, are companies to blame?



Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar



Behind the Screen: The Neurodevelopment Behind Excessive Screen Time

<p> Lethbridge School Division </p>

Breakdown of Presentation.



01

KKW Model



02

Gaming



03

Social Media
+ Chronic
Tech Use



04

Norepinephrine



05

Action
Plan/Takeaways



06

Communication
points



01 KKW Model

Explaining the different stages of human response to environmental stimuli.

Thought that humans go through **5 stages**.



Perception (Physical Feeling)

Perception, involves receiving and interpreting information from the environment through our sense.



Interpretation (Thoughts)

Interpretation involves making sense of the information we have perceived and assigning meaning to it base on our past experiences or beliefs.



Emotion (fear, happiness, etc)

Emotion involves experiencing a subjective emotional response to the interpreted information.



Behaviour (Response)

Behaviour which involves engaging in an action or response based on the perceived information and emotional response.

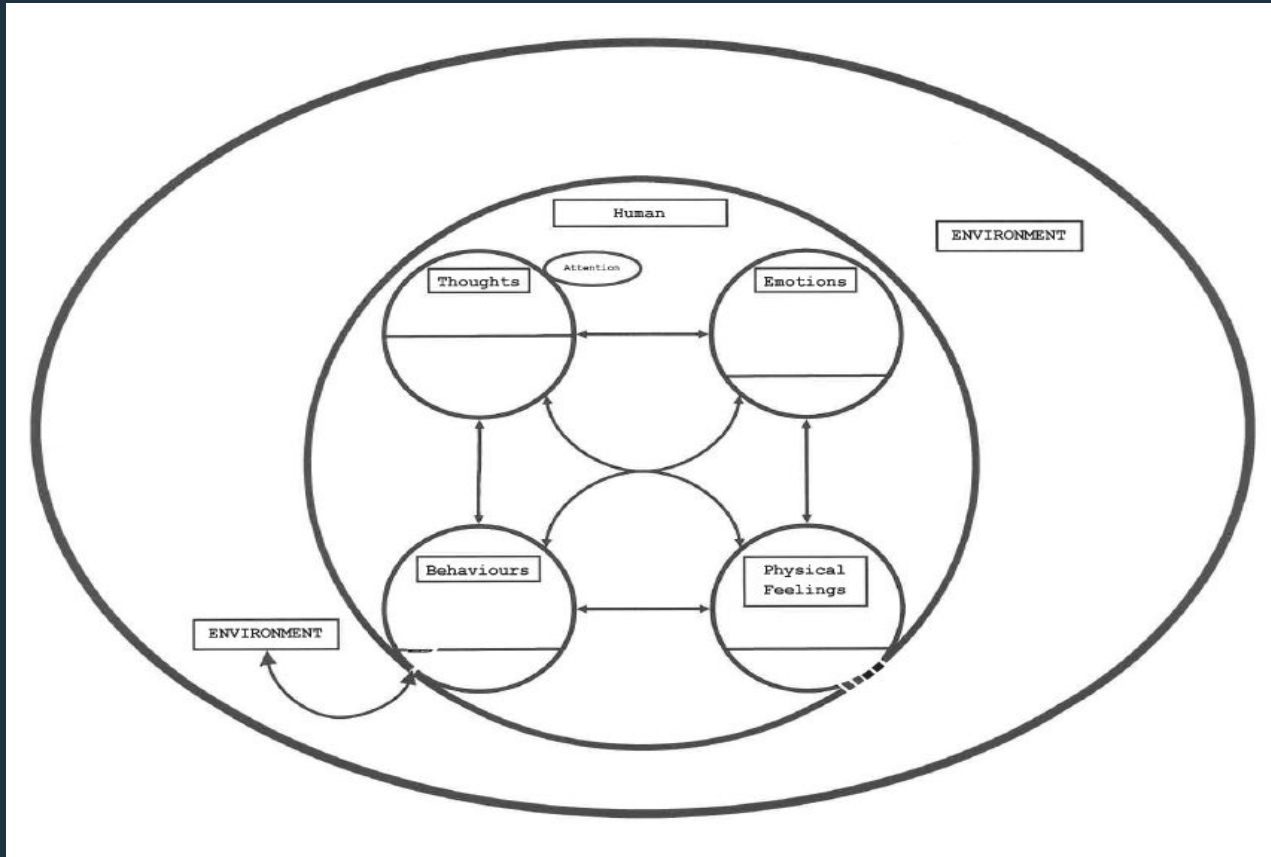


Feedback (Positive/Negative)

Feedback which involves receiving information about the outcome of the behaviour and using that information to adjust future responses.

of response

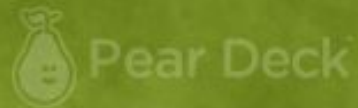
●●● KKW Model



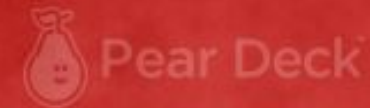
Kennyley, M., Kirk, R. E., & Westbrook, J. D. (1983). The KKW model: A model for describing the dynamics of human response to environmental stimuli. *Journal of Environmental Systems*, 13(2), 95-112.

ACCORDING THE TO KKW MODEL, THE RESPONSE TO ENVIRONMENTAL STIMULI IS: PHYSICAL → INTERPRETATION → EMOTION → FEEDBACK → BEHAVIOR?

True



False



Students choose an option

The 3 Y's

Why might this topic, question, or inquiry matter to YOU?

Why might this topic, question, or inquiry matter to my school community?

Why might this topic, question, or inquiry matter to world at large- both now and in the future?



Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar



02 Let's Talk About Our Brains

Excessive gaming and technology use increases the buildup and release of Neuromodulators & Neurotransmitters.

Let's Talk About Your Brain

Quick Breakdown

- 🧠 The human brain takes approximately 27-32 years to fully mature.
- 🧠 Ages 12-20 is noted to be the Neurological (synaptic) pruning stage in development.
- 🧠 Crucial for improving cognitive functioning, memory, and overall brain health.
- 🧠 Efficiency & Adaptability.
- 🧠 Becoming a complex, refined, and abstract thinker.



Let's Talk About Your Brain

Continued

- 🧠 What fires together, wires together. Beneficial or detrimental.
- 🧠 The Brain is anticipatory organ. Reacts based on what is has learned in the past.
- 🧠 Brain learning happens best with effective stimulation and long periods of self reflection to process learning and practice self-regulation.
- 🧠 Technology can be counter intuitive for optimal growth.


Three Notes


- 🧠 Technology inhibits the development of an integrated prefrontal cortex.
- 🧠 Technology is a stimulant to our brain and wires to the engagement centre of our brain
- 🧠 We have a misguided notion. that growing up “it is easy” to manage our technology use.

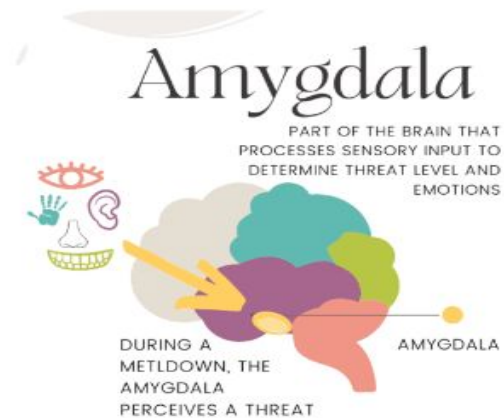
What is the Amygdala?

Let's Talk About Our Brains

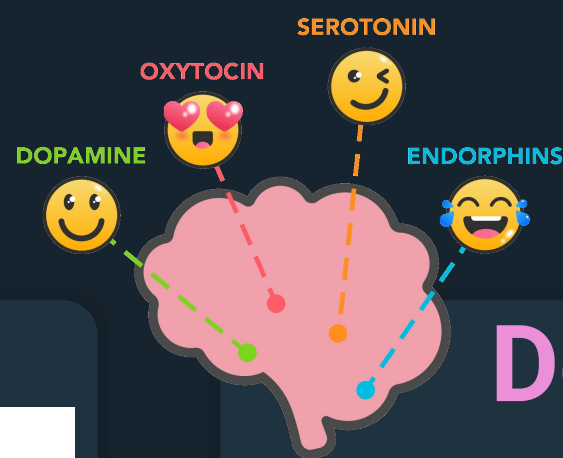
Amygdala

 **Amygdala**- The “guardian” of our emotions - Helps us feel different emotions (happy, fear, excitement, etc.).

 Excessive screen time can ignite neuromodulators in the brain, such as **dopamine**, which can affect, mood, and even lead to dysfunctional screen habits.



D.O.S.E.



Dopamine



The reward chemical in our brains.

- Novelty & unknown surprises (Updates, Notifications, etc.) is what promotes dopamine release
- Talking with others and connecting can also bring a dopamine release
- Streaks, likes, requests, notifications, and digital advancements all contribute to a high level of dopamine release.

D *Dopamine*

The **REWARD** Chemical

- Complete a task
- Eat good food
- Self-Care

O *Oxytocin*

The **LOVE** Hormone

- Give a compliment
- Hug a loved one
- Play with your pet

S *Serotonin*

The **MOOD** Stabilizer

- Meditate
- Enjoy the Sunshine
- Outdoor Exercise

E *Endorphins*

The **PAIN** Killer





- Laughter
- Eat Spicy Food
- Exercise

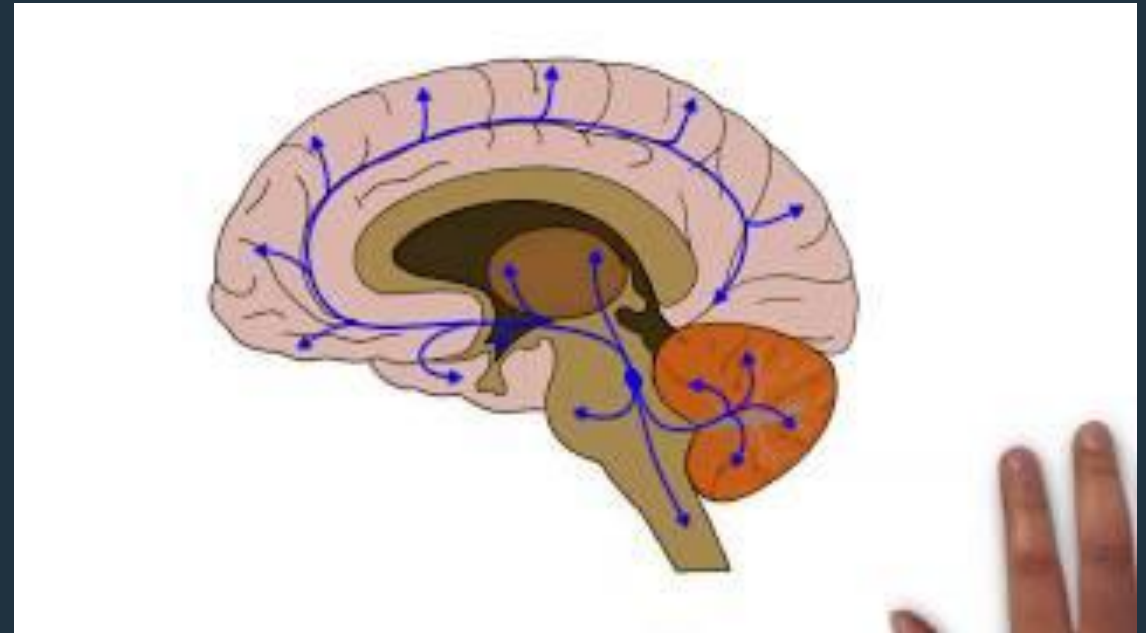


Julie Lewis

What is Norepinephrine?



-  Chemical naturally produced in the brain and body.
-  Helps one respond to stressful situations and danger.
-  Aids in maintaining our focus, alertness, and regulates our mood.
-  Important chemical that helps us respond to stress and stay focused.



Difference between:

● ● ● Norepinephrine

- Primarily responsible for increasing heart rate and blood pressure.
- Potency: Less potent in increasing heart rate and blood pressure.
- Released from CNS and acts locally.
- Chemical aided to responses and focus

● ● ● Epinephrine

- Wider range of effects, including dilating air passages in the lungs and increasing blood sugar levels.
- Potency: 10x more potent.
- Released from adrenal glands and circulates throughout the body, affecting multiple organs.
- Active body's stress response and prepare for appropriate action.

Build up of excessive Norepinephrine



When we engage in activities that are highly stimulating, such as playing video games or scrolling through social media, our brains release neurotransmitters like norepinephrine to help us stay alert and focused. Excessive exposure to these stimuli can lead to overstimulation, resulting in increased levels of norepinephrine.

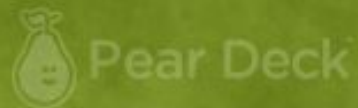
This excessive amount of release has potential to have negative effects on our body including:

1. Increased anxiety
2. Reduced sleep quality
3. Physical stress
4. Decreased productivity

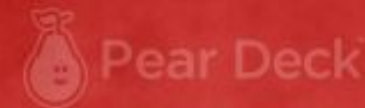


**NOREPINEPHRINE'S AID IN FOCUS, EMOTIONAL REGULATION,
AND RESPONSE TO OUR BODIES ENVIRONMENTAL STIMULI?**

True



False



Students choose an option



03 Let's Talk About Gaming

<p> Our brains tend to remember the start and the end of things but not much in between: Serial Position Effect. </p>

What is Serial Position Effect?

● ● ● Primacy effect

The first items in a list are more likely to be remembered because they have a greater opportunity to be rehearsed and encoded into the long-term memory.

Recency effect

The last items in a list are also more likely to be remembered because they are still in our working memory when we try to recall the information.

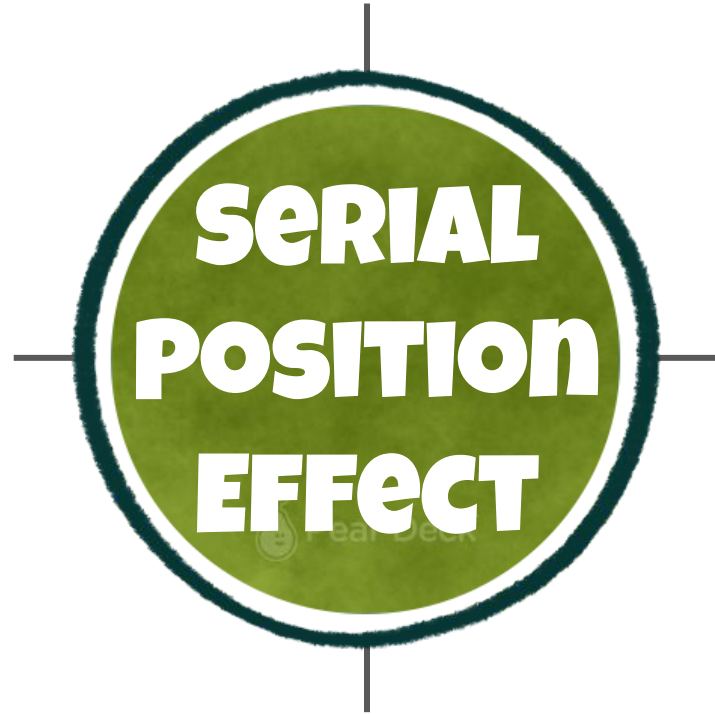
Interference

The items in the middle of a list are more likely to be forgotten because they are more likely to be interfered with by other information that is ongoing.

Attention

Our attention tends to be focused more on the beginning and end of an event or experience, which can make those part more memorable.

THE FOUR KEY POINTS WE DISCUSSED RELATING TO THE SERIAL POSITION EFFECT WERE?



Students, draw anywhere on this slide!



Set Up of Games

It is said that some video games are set up in a strategic way to enhance the Brain's dopaminergic release.

-Fortnite-

Consistent stream of triggers that enhances the release of dopamine.

Keeps players engaged and motivated by the consistent challenges, rewards, and completion of task notifications to keep the game exciting and unpredictable.



The psychology behind the video game setup



“

“In particular, gaming has been shown to foster **communication skills, teamwork, problem-solving abilities, and creativity**, as well as **belonging and connection.**”



– Dr. Andrew K. Pryzbylski

Self Determination Theory



Autonomy

Desire to be self directed and have the freedom to choose.



Mastery

is a state of exceptional skill or expertise in a particular field or activity.



Purpose

Desire to be apart of something bigger and provide meaningful experiences.

Social Needs

3 C's of Video Gaming



Competence

Development of confidence and achievement through actions within the video game.

Mastery



Connection

By playing together players build relationships, form friendships, and develop a sense of community.

Purpose



Control

Video Games enhance creativity and ability to develop personal agency.

Autonomy

Video Gaming Recap

The impact of video games on the brain is complex and multifaceted.

It is important to note we approach these claims with nuanced perspectives, not all players will experience the same emotional, psychological, and social responses.

However it is crucial to not that the purpose was to be enjoyable and entertaining.

If there are negative effects transpiring perhaps we can engage in other activities that promote relaxation and reduce the stress response in the brain.

Strategies that promote **Digital Wellness.**

Mindful Use

Improve your performance by incorporating frequent breaks and scheduled time away.

Movement

The human body craves movement to realign and avoid potential long term drawbacks.


Technoference

Aim to avoid technoference(losing touch with physical surroundings).

Connect socially with someone in the physical to check-in and ensure emotional responses are aligned with our best self.


DRAG YOUR DOT TO THE “3’CS” WE DISCUSSED GAMING CAN ENHANCE?



 Pear Deck


Communicate,
collaborate, connection



 Pear Deck

Competence,
connection, control



 Pear Deck

Creativity, community,
coordinate



Students, drag the icon!



04 Social Media + Chronic Tech Use

Explaining the different stages of social media use and the effects it can have on our brains and body.





Social Media Usage.

When we use social media we often begin viewing the world from an internal perspective rather than the external perspective we normally have.



Natural Responses.

Our responses, emotions, thoughts, and physical sensations are reflected at us in a reversed manner.

This can lead to potential challenges with self concepts, image, anxiety, and several other mental health complexities.



Social Media Connections

Excessive social media use and exposure can potentially impair neurological pruning in several ways:

Reduce Cognitive Function

- Decreased time spent on other activities (reading, problem solving, IRL interactions). Every choice has a trade-off.

Increased Distraction

- Highly engaging and captivating for dopamine release. This can be very stimulating and has potential to disrupt brain natural pruning stages.

Physical/Mental Effects

- Excessive screen time can alter the brain natural process of its release of melatonin.
- Comparison, competition, and criticizing.

Micro-cultural Interactions

- Reduced face-face interactions.
- Further effect the brains ability to develop and refine social skills through pruning.





Illusive Designs



Stimulation
Appeals to our sensory system



Algorithms
Targeted advertisements



Infinite Information
Endless scrolling



Engaging Influence
App features



Hypothalamus

Hey PG! Stressor;
another negative post.

Pituitary Gland

On it! Adrenals,
release the cortisol

Adrenal Glands

Roger, cortisol go help
the bloodstream

Cortisol

Cortisol to save us
all!

Stress in the Body

1. **Hypothalamus** sends a chemical message to the pituitary gland.
2. The **pituitary gland** sends a chemical message **AC** (adrenocorticotrophic hormone) through the brain to the adrenal glands.
3. The **AC** tells the **adrenal glands** to produce **cortisol**
4. **Cortisol** flows through the blood stream and tells the body what to do next.

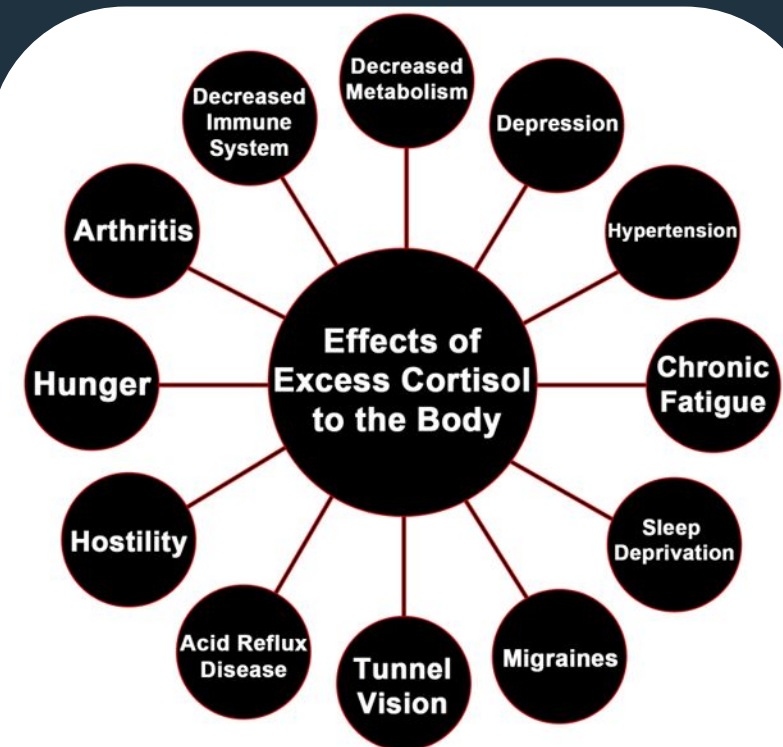
Cortisol Levels



Cortisol increases blood sugar levels, suppresses the immune systems, increases heart rate, which could lead to chronic addiction.

When cortisol levels are increased for a prolonged time it can be linked to potential health complexities such as:

1. Suppressed immune function
2. Digestive problems
3. Weight gain
4. Mental Health obstacles
5. Cardiovascular disease



Cortisol - The Stress Hormone

WHAT IS ONE OF THE THING(S) EXCESSIVE CORTISOL RELEASE IN THE BODY CAN POTENTIALLY LEAD TO?



Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar

Brain Activity Connected to Social Media



Reward System (Mesolimbic Pathway)

Notifications, received messages, and promotion of engaging media can create a feedback loop of engagement.



Craving

This can lead to compulsive or addictive behavior and the need for more social media use.



Marketing

Social media companies have intentionally designed their platforms to promote reward processing and increase engagement.

**HAVE YOU EXPERIENCED
THE DEMAND AND
PRESSURE OF
ENGAGING IN SOCIAL
MEDIA?**

**HOW DOES THIS IMPACT
YOUR WELLNESS?**



Pear Deck



Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar

Potential cues to build Awareness

Spending more
time than
intended.

Neglecting other
I.R.L. activities
or
responsibilities.

Withdrawal
symptoms while not
using platforms.
(depression,
anxiety,
irritability, etc).

Addiction is a complex and multifaceted condition.

This should be considered before we adopt this vocabulary- Let's look at the DSM



05 Where do we go from here? **Action Plan**

How do we use this newly acquired knowledge to flourish in the digital world?

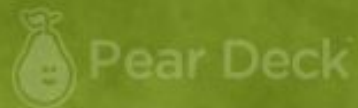


HUMANE DESIGN

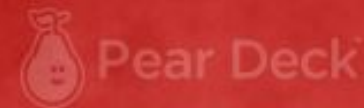
- Good media habits contribute to healthy and happy lives.
- Humane design is an alternative to addictive design in media creation.
- **Let's discuss some of our digital platforms and the value/ design around them? Are they humane?**

Rewards Increase As You Play More....

Addictive



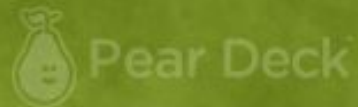
Humane



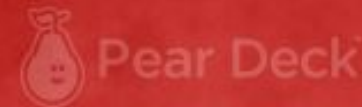
Students choose an option

Periodic alerts asking if you want to quit playing or scrolling?

Addictive



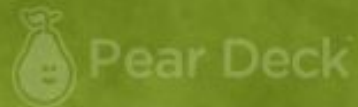
Humane



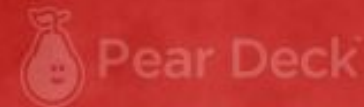
Students choose an option

Suggestive options for offline activities....

Addictive



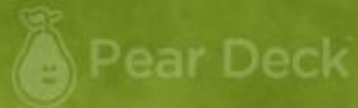
Humane



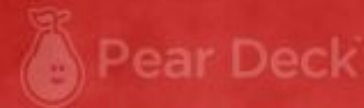
Students choose an option

In app daily streaks that prioritize engagement?

Addictive



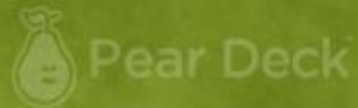
Humane



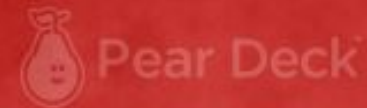
Students choose an option

Auto play and countdown features....

Addictive



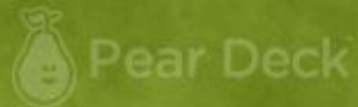
Humane



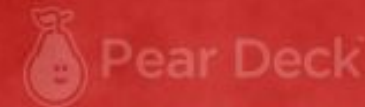
Students choose an option

Settings to keep track of usage time and monitor time spent.

Addictive



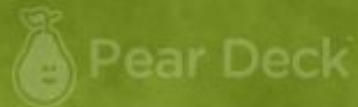
Humane



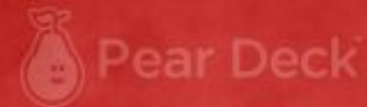
Students choose an option

Bottomless Scroll / Swipe....

Addictive



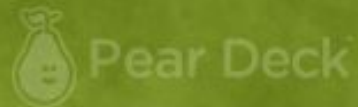
Humane



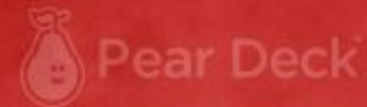
Students choose an option

Dark Mode Option

Addictive



Humane



Students choose an option

Learning Extension...



TECHNOLOGY AUDIT

NAME OF DEVICE, APP, OR GAME: _____

Humane Design	Engaging Design

CRITICAL THINKING REFLECTION...

Write three guidelines to help you keep track of your behavior as you use different apps with the engaging designs.

Interactive Media	
Gaming	
Video Streaming	

Story Time: The Park



Steps to promote **Digital Wellness.**



Model

Model appropriate for others to see in a leadership capacity.

Purposeful

What was the intent when I initially opened the platform? (Task, social, entertainment?)

Manage

Manage when, where, how we are using our technology.

Parameters

Set boundaries, moderate usage, be selective of disengagement from the physical environment.

Monitor

Monitor our responses, mood, emotions before and after technology usage.

Preparedness

Navigate with peer mentorship. Avoid blame, ask for guidance, and engage in conversations with peers.

P X E X S³ (SMALL SIMPLE STEPS)

WHAT IS ONE STEP YOU'RE GOING TO TAKE TO IMPROVE ONE FACETS OF YOUR DIGITAL WELLNESS?

NAME IT:

TAME IT:

PROCLAIM IT:



Pear Deck



Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar



06 Questions, Comments or Inquiries?

This is an evolving space we're in together, learning and navigating landscape that is continuously changing and offering several new experiences. Let's take time to disconnect to reconnect.

THANK
YOU!



Do you have any
questions,
comments, or
inquiries?

✉ Cason.machacek@lethsd.ab.ca

📱 (403) 892-07**

🌐 <https://digitalwellnessteam.schoolsites.ca/>

Alberta Education Curricular Links

● ● ● Physical Education & Wellness Curriculum

L.O. #6- Students examine risk and identify factors that influence actions.

Health and Life Skills Program of Studies

Wellness- 2- Positive Health Habits

Relationships- 3- Stress and Stress Management

Career and Life Management

Personal Choices- 2- Evaluate choices and combinations of choices that can create barriers to achieving and maintaining health, and identify actions to improve health.

Personal Choices- 7- Analyze a variety of strategies to achieve and enhance emotional and spiritual well-being.

Personal Choice- 13- Investigate how science, technology, and media affect wellness.



06 Questions, Comments or Inquiries?

This is an evolving space we're in together, learning and navigating landscape that is continuously changing and offering several new experiences. Let's take time to disconnect to reconnect.

THANK
YOU!



Do you have any
questions,
comments, or
inquiries?

✉ Cason.machacek@lethsd.ab.ca

📱 (403) 892-07**

🌐 <https://digitalwellnessteam.schoolsites.ca/>

Alberta Education Curricular Links

● ● ● Physical Education & Wellness Curriculum

L.O. #6- Students examine risk and identify factors that influence actions.

Health and Life Skills Program of Studies

Wellness- 2- Positive Health Habits

Relationships- 3- Stress and Stress Management

Career and Life Management

Personal Choices- 2- Evaluate choices and combinations of choices that can create barriers to achieving and maintaining health, and identify actions to improve health.

Personal Choices- 7- Analyze a variety of strategies to achieve and enhance emotional and spiritual well-being.

Personal Choice- 13- Investigate how science, technology, and media affect wellness.

CREDITS.

Presentation Template: [SlidesMania](#)

Sample Images: [Unsplash](#)

Fonts used in this presentation: Roboto Mono and **Roboto Bold**

Channel 4 News. "Fortnite: What happens to your brain when you play" | YouTube. 04 Apr 2019, <https://www.youtube.com/watch?v=06QhTffGF0k&t=80s>

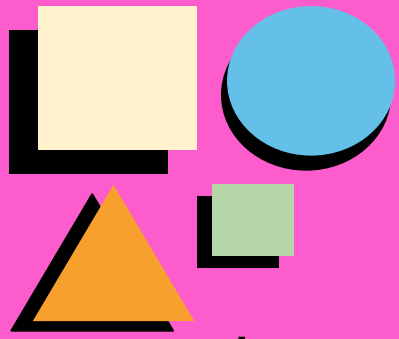
Neuroscientifically Challenged. "2- Minute: Neuroscience Norepinephrine" | YouTube. 04 Apr 2021, <https://www.youtube.com/watch?v=m8kthAppQys>

Kennyley, M., Kirk, R. E., & Westbrook, J. D. (1983). The KKW model: A model for describing the dynamics of human response to environmental stimuli. *Journal of Environmental Systems*, 13(2), 95-112.



Grudge
Ball
Review
Game



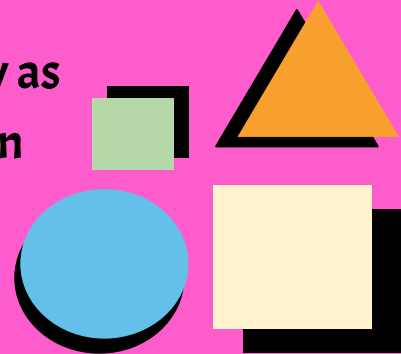


Breakdown

Each team starts out with 10 (X's) or Points.

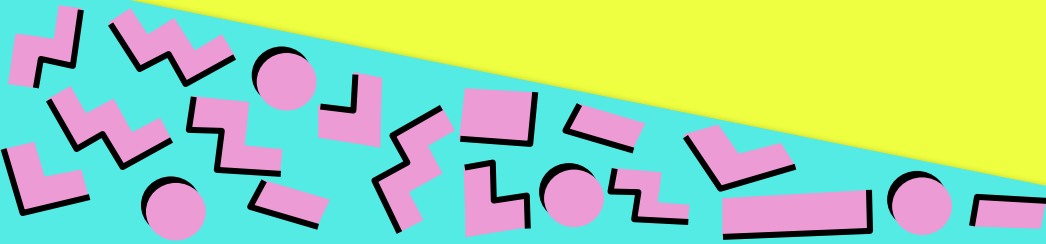
Objective: Be the last team with points, knock other teams out of the game by taking away their points. Use appropriate Method for Questions Distribution (Spinning wheel, multiples per team, take turns, self paced, etc.)

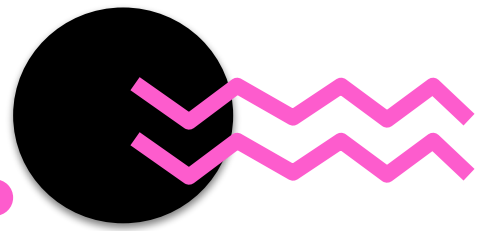
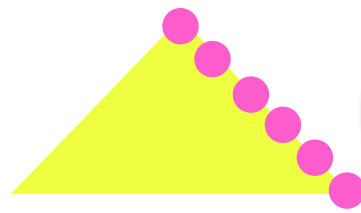
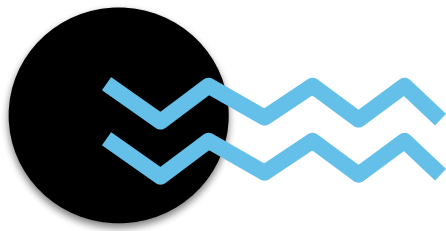
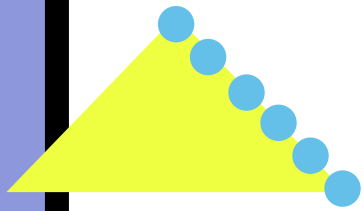
Goal: Earn the ability to knock off points by answering questions correctly as a team. Each team will receive their own set of questions to answer to earn ability to eliminate other team's "X's."



Breakdown Continued...

- ❑ **Answering Correctly= Knock “1” X (points) of any team**
- ❑ **If you answer correctly you get a chance to take a “2” or “3” point attempt. (To add potentially 1 or 2 more X’s (points) you can eliminate from a team.**
 - ❑ **2 Pointer= Knock “2 Total” X’s (points) off the board.**
 - ❑ **3 Pointer= Knock “3 Total” X’s (points) off the board.**
 - ❑ **When distributing your X’s (points taken from teams), you can choose to split the distribution of your X’s among multiple teams if you have more than 1 to take away from opposing teams..**
- ❑ **If you miss you can still take off your “1” X earned from a teams total.**

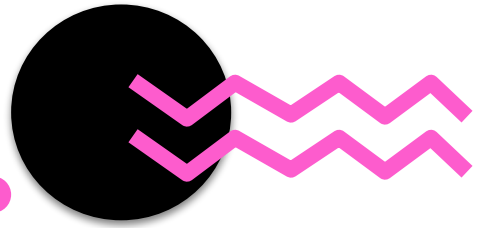
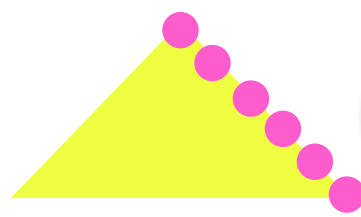
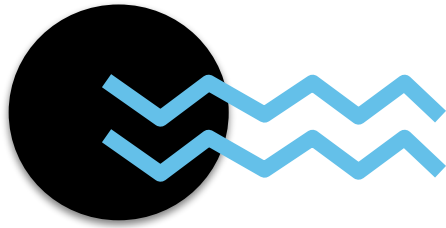
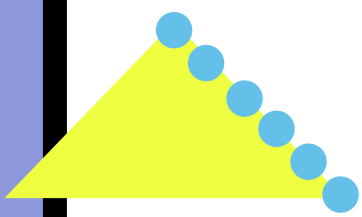




As the Game Progresses

When a team loses all of their X's, they're out! To get back in the team will have to answer questions correctly without attacking other teams until they have regained at least 3 X's → These teams will receive a shot from the (2 or 3) point line each correct answer!

Last team standing with the most X's is the winner!



Gameplay Layout/Materials

Materials



- Whiteboard, marker, and eraser- per team.
- Door-hanging basketball hoop or trash can may also be used with crumpled up paper.
- 2 & 3 point line indicator (tape can be used)
- Whiteboard/ Game Board images for scoreboard
- Created gameplay questions (template on following slides)





Game Management

Any disrespectful or obnoxious behavior loses your team an X at the teacher's discretion. If anyone on your team has their phone or materials out your team also loses an X.

Repeat offenders will be taken out of the game and asked to complete a secondary activity.



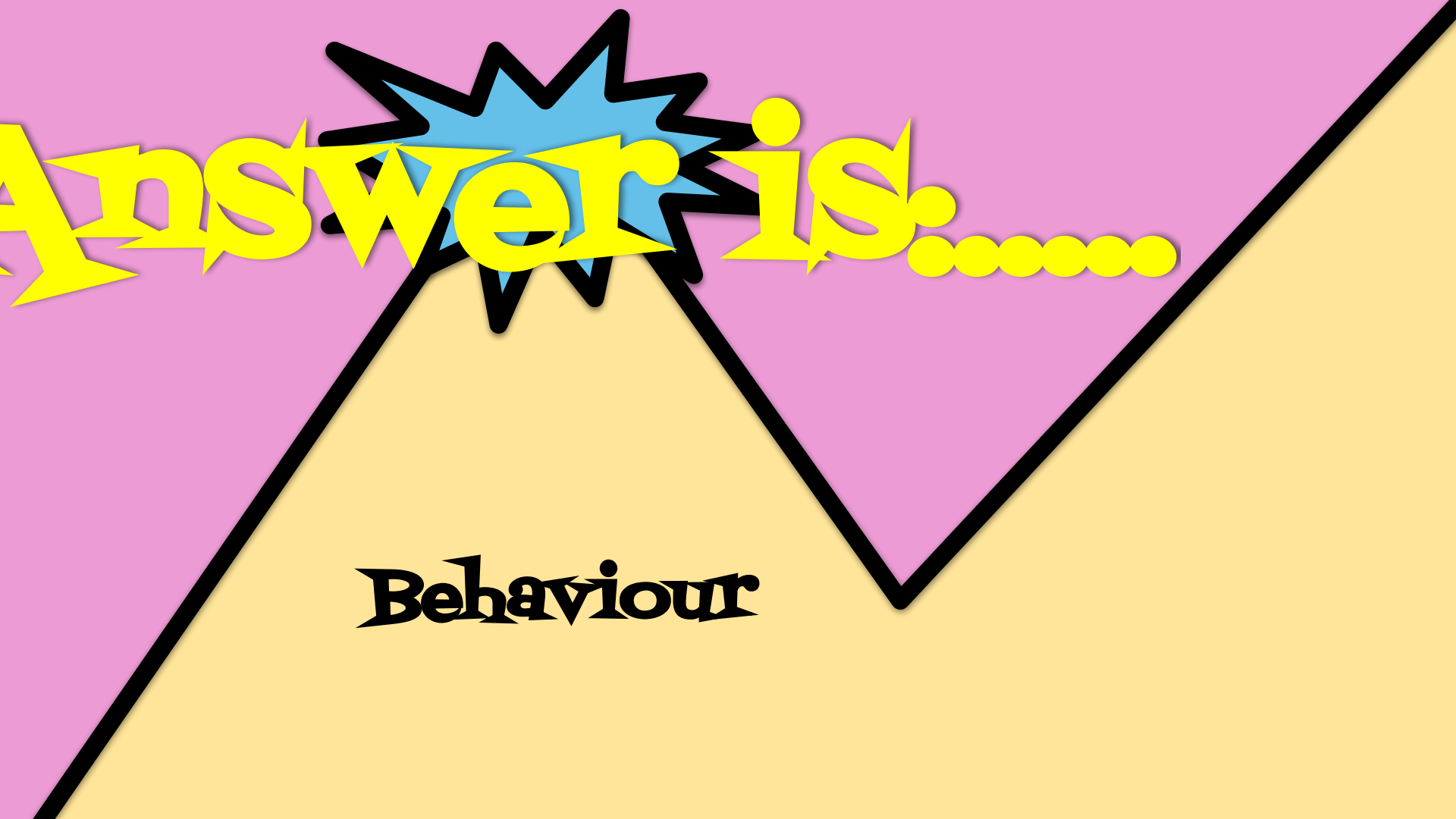
Let's Go!



Question#1

The stage within the KKW Model that involves an action or response is called?

Answer



Answer is:.....

Behaviour



Question #2

**The effect in which
our brains
remember beginning
and end of events is
called?**



Answer

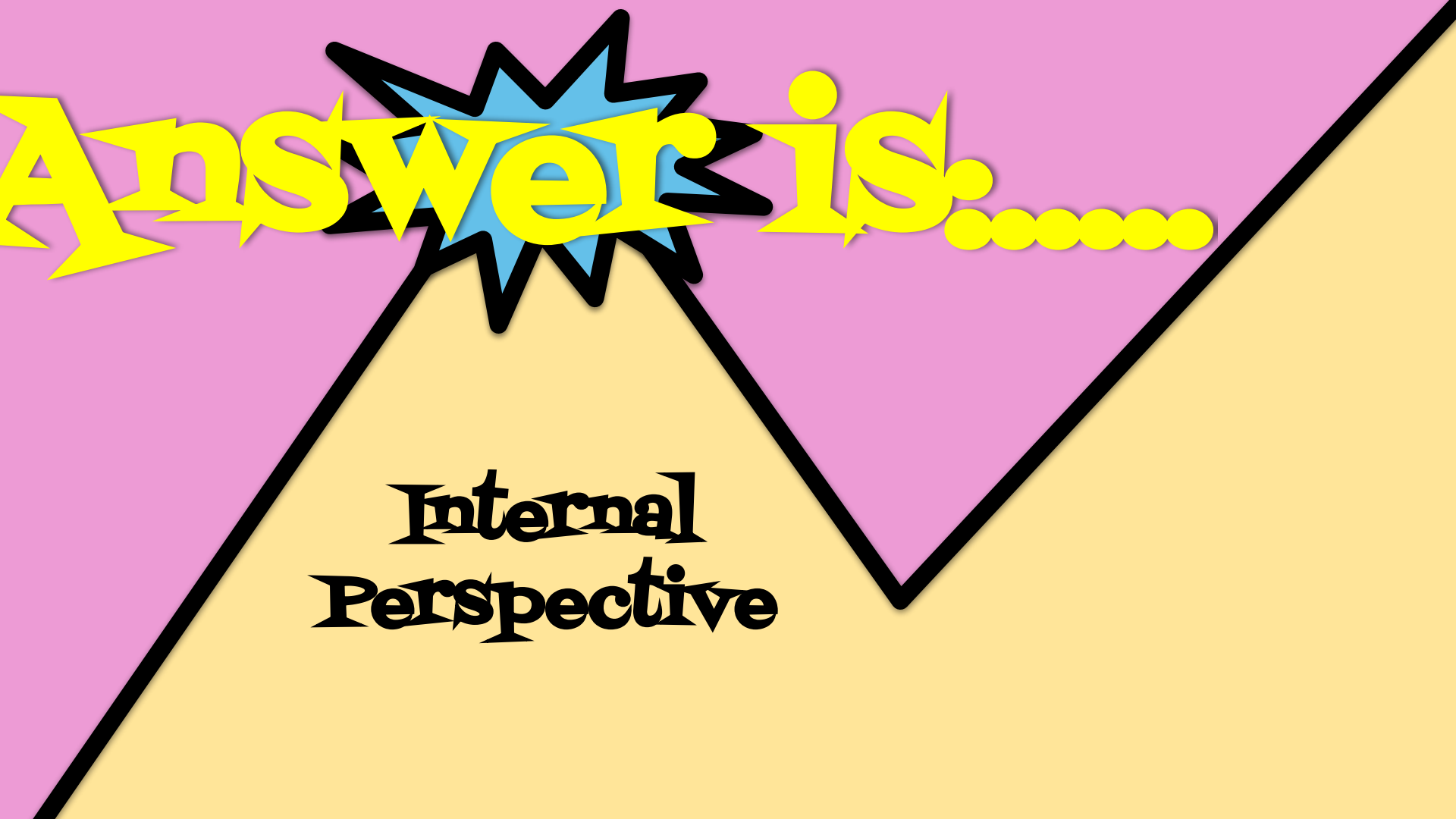
Answer is.....

**Serial
Position
Effect**

Question#3

Social media often offers viewers a _____ perspective, opposite of the perspective we normally receive.

Answer



Answer is:.....

**Internal
Perspective**



Question #4

Prolonged gaming and
technology use
_____ the build up
of Norepinephrine



Answer



Answer is:.....

Increases

Question#5

What others see,
view interpret or
take can be
referred to as _____

Answer

Answer is.....

**Model/
Representing**



Question #6

Define:

Perception?



Answer

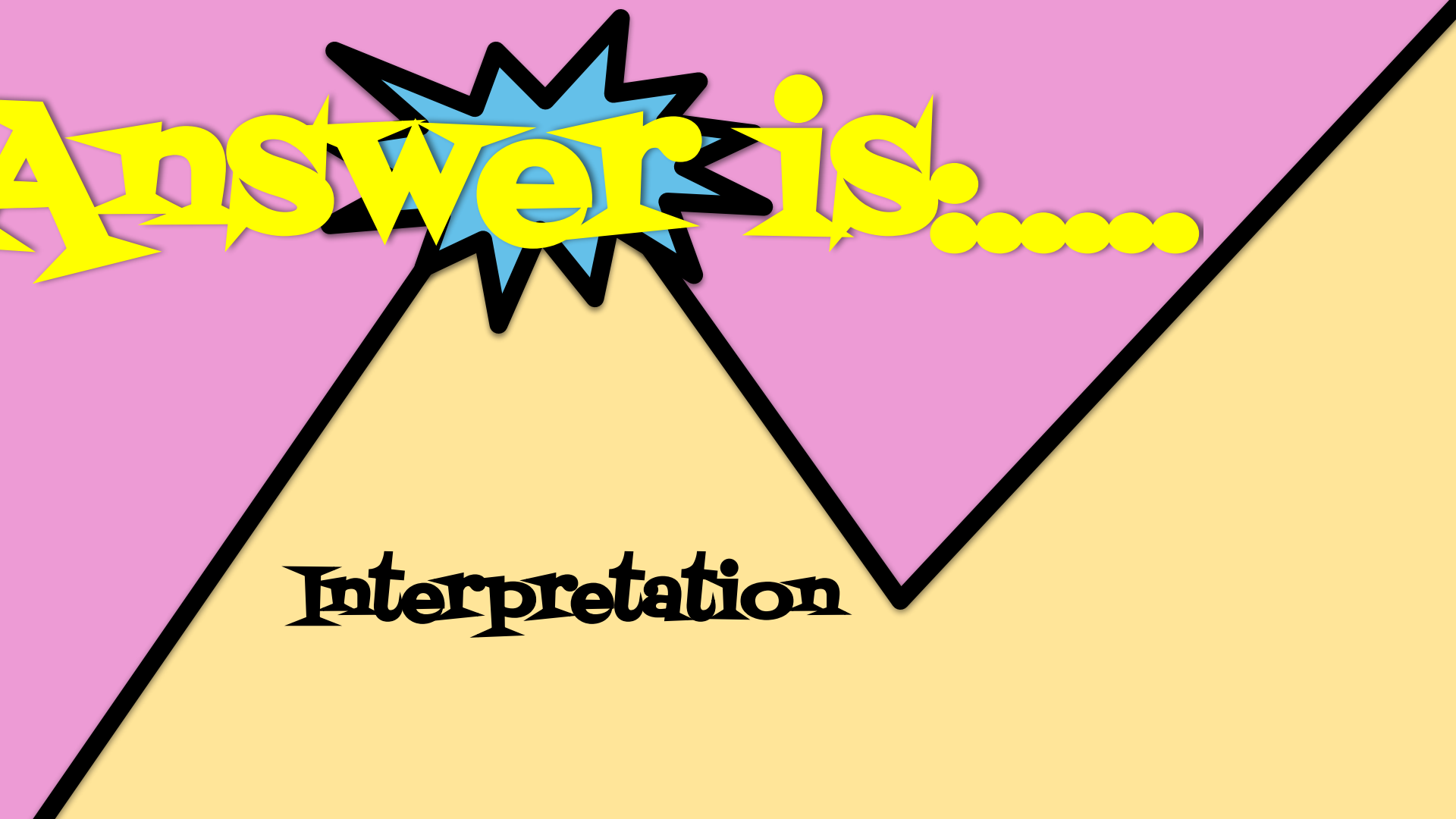
Answer is.....

**Interpreting
information from
our senses**

Question#7

The stage within the KKW Model that aligns with our thoughts is called?

Answer



Answer is.....

Interpretation

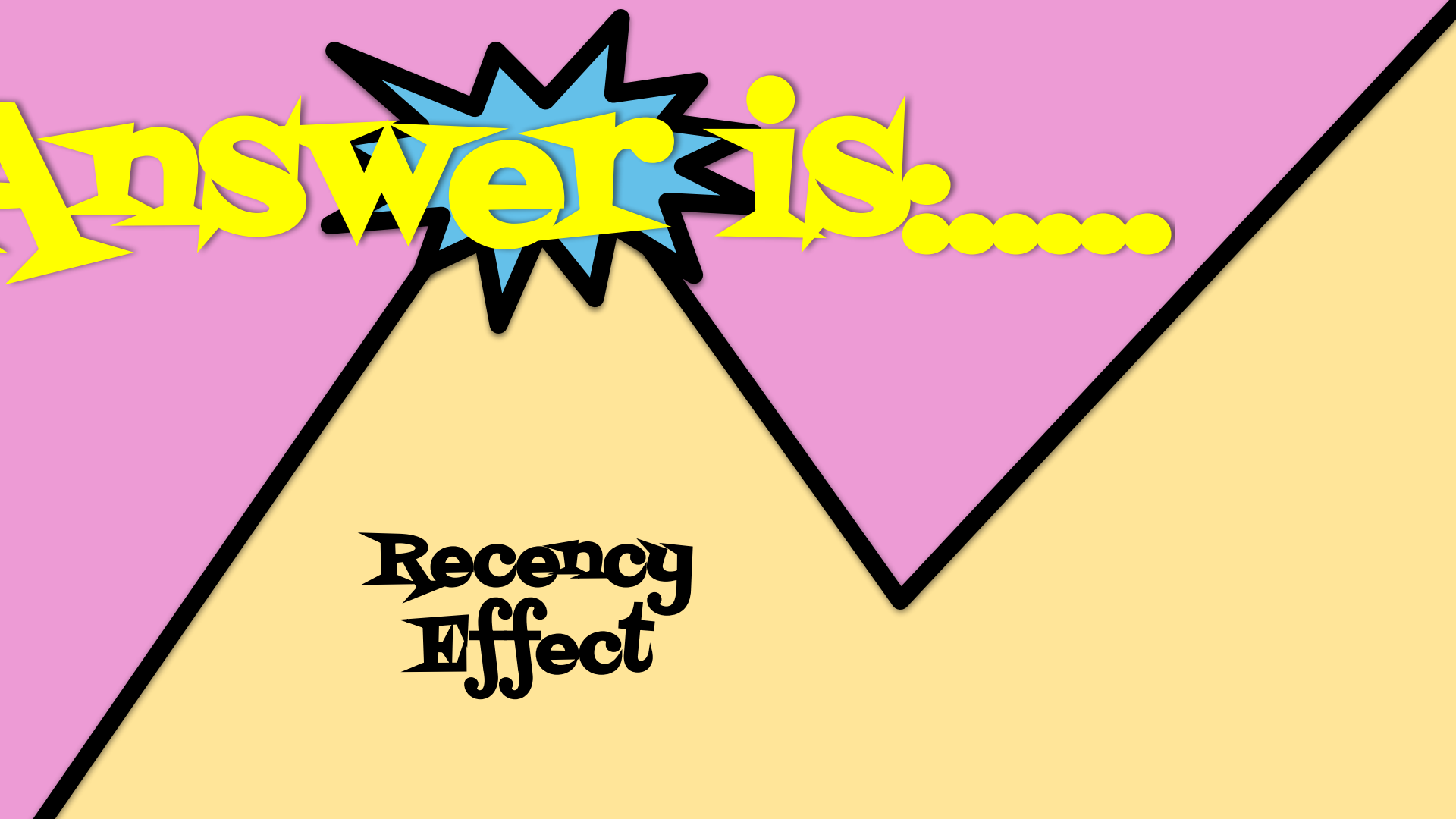


Question #8

Recalling the last item, topic talked about, or part of a game is called?



Answer



Answer is.....

**Recency
Effect**

Question#9

The part of the brain that sends a chemical message to the P.G.

Answer



Answer is.....

Hypothalamus



Question #10

**Norepinephrine aids
in the ability to
maintain?**



Answer



Answer is:.....

Focus and Alertness

Question#11

Setting boundaries, limits, and appropriate places to use tech is called

Answer

Answer is.....

**Establishing
Parameters**

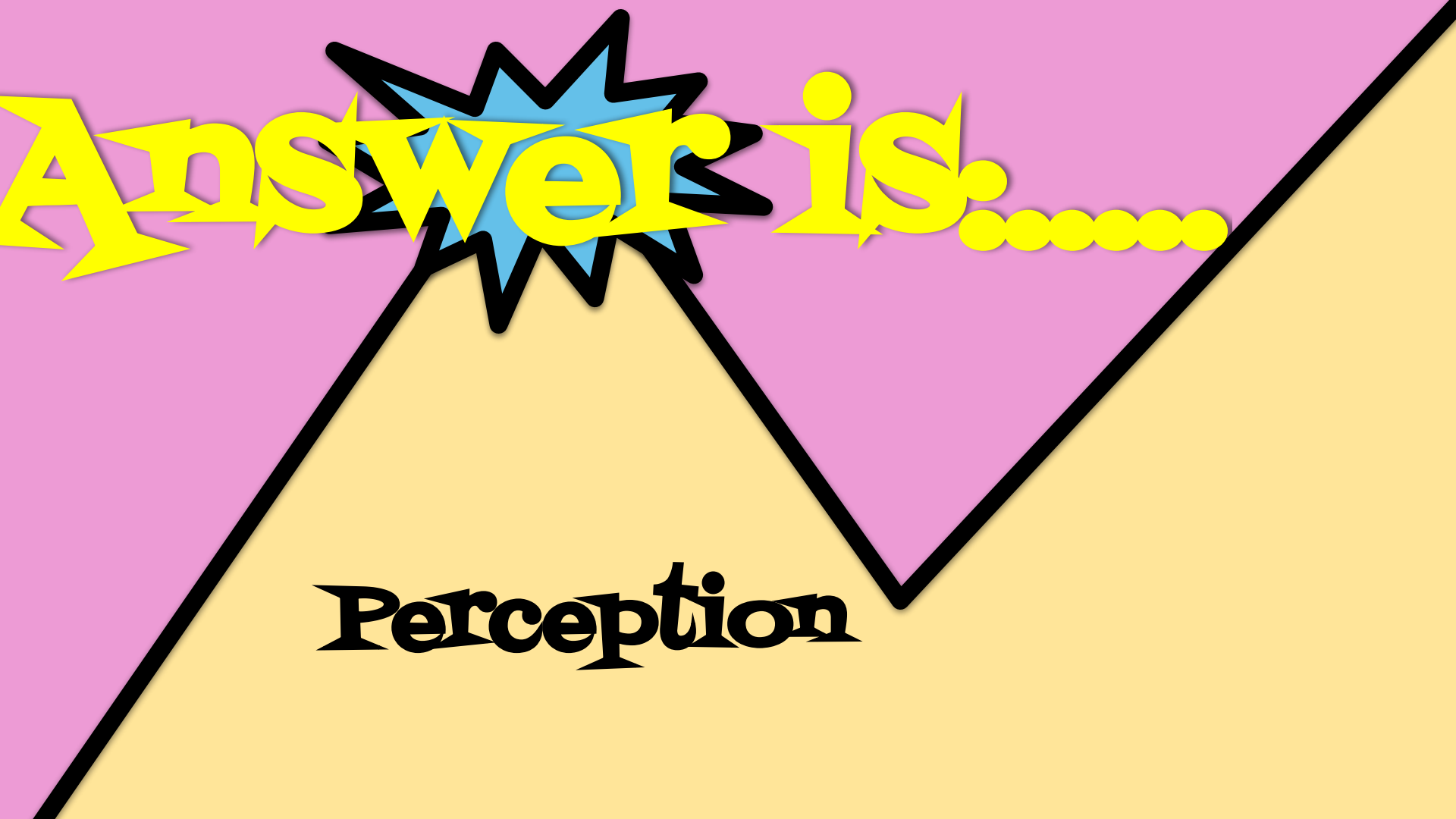


Question #12

The stage within the KKW Model that associated physical feelings is called?



Answer



Answer is:.....

Perception

Question#13

Video games are set up in a strategic way to enhance the brain's release of?

Answer



Answer is:.....

Dopamine



Question #14

_____ flows through the blood stream and tells the body what to do next?



Answer



Answer is.....

Cortisol

Question#15

**Epinephrine
is triggered
in a body
response to?**

Answer

Answer is.....

**Stress
(Fight, Flight,
Freeze, Fawn)**

Question#16

The act of intentionally completing or using technology could be know as?

Answer


Answer is.....

**Purposeful
Use**

Question#17

The stage within the KKW Model that analyzes the outcome of a action/behaviour is called?

Answer



Answer is.....

Feedback

Question#18

What were the three C's that video games can help enhance and develop?

Answer

Answer is:.....

Competence

Control/Creativity

Connection

Question#19

Notifications, received messages, and promotion speak to the brains _____ system?

Answer

Answer is.....

**Mesolimbic Pathway-
Prefrontal Cortex- Reward System**

Question#20

When navigating new platforms or exploring new content we should always seek to do so alongside a

_____?

Answer

Answer is.....

**Trusted
Peers**

THANK YOU FOR YOUR SUPPORT!

I wanted to take a moment to express my heartfelt gratitude for your support and initiative in educating students about digital wellness, healthy balance, and responsible technology usage. Your dedication and commitment to your students' well-being is inspiring. The knowledge and skills you're imparting in your students will have significant impact on their lives, both now and in the future.

We would love to invite you to visit our website for more similar activities or reach out to me directly for any further assistance or information, if you found this resource helpful, purposeful, and engaging.



Cason Machacek

 Lethbridge School Division

 Digital Wellness Teacher

 (403) 380-5300 Ext: 12261

 (403) 892-0782

 Cason.machacek@lethsd.ab.ca

