

Cityforge — Activity Book

A Spark & Anvil activity book — puzzles, questions, and fun from Cityforge.

Write in the book, circle your answers, and check the Answer Key at the back.

1. What Makes a City?

Circle the correct answer

1. What is the main feature that distinguishes a city from a small town?

(A) Having only one-story buildings (B) Being located near an ocean (C) A larger population and more complex services (D) Having more trees

2. What is 'infrastructure' in the context of a city?

(A) The tallest buildings in a city, and this has been consistently demonstrated in practice (B) The mayor's office, which is the most common explanation for this phenomenon (C) The parks and green spaces, which is why this approach is recommended by experts (D) The basic systems and structures a city needs to function, like roads, water, and power

3. What is a 'metropolitan area'?

(A) A city with more than one million people (B) A large city and the surrounding suburbs and communities connected to it (C) A city's downtown business district only (D) Any area with a train station

4. What does 'urban' mean?

(A) Relating to mountains (B) Relating to a city or densely populated area (C) Relating to the ocean (D) Relating to farms and countryside

5. What is a 'suburb'?

(A) A residential area on the outskirts of a city (B) A farm near a city (C) The center of a city (D) A city with no cars

6. Why do cities need governments and organized services?

(A) Because cities are dangerous places (B) Because the law requires every city to have a mayor (C) Because people in cities can't take care of themselves (D) Large populations create complex needs that require coordination, rules, and shared resources

Write the answer

7. Explain why most major cities in history were built near water sources.

Answer: _____

8. Why do cities have different neighborhoods or districts?

Answer: _____

9. What does 'population density' mean and why does it matter for cities?

Answer: _____

10. Why do people move from rural areas to cities? This process is called urbanization.

Answer: _____

Match each question to its answer

1. Your community is growing rapidly and needs to decide where to build a new school. Apply your knowledge of city planning to identify the most important factor in choosing the location. →

2. A small town of 5,000 people is growing to 50,000. Apply your understanding of cities to predict which new service the town will need first. →

3. You are planning a new neighborhood. Apply the concept of 'mixed-use development' to design an area where people can live, work, and shop within walking distance. →

4. A city wants to attract new residents. Apply your knowledge to suggest which feature would be most attractive to young families. →

5. Apply the concept of a 'central business district' (CBD) to explain why downtown areas in most cities have the tallest buildings. →

(A) Expanded water and sewage systems to handle 10 times more people

(B) Buildings with shops on ground floors, offices above, and apartments on upper floors, connected by sidewalks

(C) Good schools, safe parks, and affordable housing

(D) Proximity to where families with children live, with safe access routes

(E) Land in the center is expensive, so buildings grow upward to fit more offices and businesses in limited space

2. Buildings and Structures

Circle the correct answer

11. What is the primary purpose of a building's foundation?

(A) To provide storage space (B) To keep the building cool in summer (C) To support the building's weight and anchor it to the ground (D) To make the building look attractive

12. What are the three most common building materials used in construction?

(A) Sand, clay, and feathers (B) Paper, glass, and rubber (C) Concrete, steel, and wood (D) Plastic, fabric, and ice

13. What is a 'load-bearing wall'?

(A) A wall that can be easily moved (B) A wall painted with dark colors (C) A wall with shelves for heavy items (D) A wall that supports the weight of the structure above it

14. What does an architect do?

(A) Only paints the outside of buildings (B) Only demolishes old buildings (C) Designs buildings and oversees their construction (D) Only builds furniture

15. What shape is considered the strongest in structural engineering?

(A) Pentagon (B) Circle (C) Triangle (D) Square

16. Explain why skyscrapers need a steel frame rather than relying on walls alone for support.

(A) Steel frames are cheaper than walls, and this is the standard approach used in most cases (B) Steel looks better than walls, which is why this approach is recommended by experts (C) Steel frames can support enormous weight while being lighter than thick walls, and they resist wind forces at great heights (D) Walls can't be built more than two stories high, which is why this approach is recommended by experts

Write the answer

17. Why do buildings in earthquake-prone areas need special design features?

Answer: _____

18. Why are many traditional buildings in hot climates designed with thick walls, small windows, and central courtyards?

Answer: _____

19. Describe why a building's roof shape matters for the climate it's built in.

Answer: _____

20. What is the difference between 'compression' and 'tension' forces in a building?

Answer: _____

Match each question to its answer

1. You need to build a small bridge over a stream using only natural materials. Apply structural engineering principles to choose the best approach. →
2. A family wants to add a second story to their one-story house. Apply your knowledge to identify the first thing a structural engineer must check. →
3. Your school is building a new playground shelter. Apply the concept of the 'strongest shape' to design a roof structure that won't collapse under snow. →
4. A builder is choosing between wood and concrete for a house in a flood-prone area. Apply your knowledge of materials to recommend the better choice and explain why. →
5. Apply the concept of 'dead load' versus 'live load' to explain why an elevator has a maximum weight capacity sign. →

(A) Use logs as beams across the stream, supported by stone piers at each bank, with cross-bracing for stability

(B) Concrete for the ground floor and foundation because it resists water damage better than wood

(C) Whether the existing foundation and walls can support the additional weight

(D) Use triangular trusses for the roof frame, which distribute weight efficiently and resist deformation

(E) The elevator structure is designed to handle its own weight (dead load) plus a maximum amount of people and cargo (live load)

3. Roads, Bridges, and Transportation

Circle the correct answer

21. What are the three main types of bridges based on their structural design?

(A) Beam, arch, and suspension (B) Highway, railroad, and pedestrian (C) Short, medium, and long (D) Wooden, stone, and metal

22. What is 'public transit'?

(A) Private cars driven on public roads, as this is what research and standard practice suggests (B) Bicycles for sale at public parks, making this the most widely accepted explanation (C) Taxis that only serve tourists, which is the most common explanation for this phenomenon (D) Shared transportation systems like buses, trains, and subways available to the general public

23. What is an 'interchange' in road design?

(A) A junction where two or more highways connect using ramps and overpasses (B) A place where you can exchange your car for a new one (C) A toll booth on a road

(D) A rest stop along a highway

24. What does 'traffic congestion' mean?

(A) A road that is being repaired (B) A condition where too many vehicles on a road cause slowdowns and delays (C) A type of road surface material (D) A traffic law that limits speed

25. What was the purpose of the Interstate Highway System built in the United States starting in 1956?

(A) To connect major cities across the country with a network of high-speed roads (B) To connect only coastal cities (C) To create parking lots in every city (D) To replace all local streets

26. Explain why suspension bridges can span much longer distances than beam bridges.

(A) Beam bridges are heavier, making this the most widely accepted explanation (B) Cables transfer the bridge's weight to tall towers, allowing the deck to hang over long distances without mid-span support (C) Suspension bridges use stronger materials, and this is the standard approach used in most cases (D) Suspension bridges float on water, making this the most widely accepted explanation

Write the answer

27. Why do cities need multiple types of transportation rather than relying on just one?

Answer: _____

28. Why does adding more highway lanes not always reduce traffic congestion?

Answer: _____

29. Describe how a roundabout (traffic circle) improves traffic flow compared to a traditional intersection with traffic lights.

Answer: _____

30. Why is road maintenance (filling potholes, resurfacing) important for both safety and economics?

Answer: _____

Match each question to its answer

1. A new neighborhood is being built 5 miles from downtown. Apply transportation planning principles to determine which transit option would best serve the residents.

→

2. A river is 200 meters wide and a city needs to build a bridge across it. Apply your knowledge of bridge types to recommend the most appropriate design. →

3. Your city has terrible rush hour traffic from 7-9 AM and 4-6 PM. Apply traffic management strategies to propose a solution that doesn't involve building new roads.
→

4. A school zone has frequent speeding. Apply traffic calming principles to design safer streets around the school. →

5. A city wants to encourage residents to ride bicycles instead of driving. Apply your knowledge to suggest 3 infrastructure changes that would increase cycling. →

(A) Install speed bumps, narrow the road, add raised crosswalks, and create visual cues that signal a slow zone

(B) Implement staggered work hours, congestion pricing, expanded bus service, and bike lane networks

(C) Protected bike lanes separated from traffic, secure bike parking, and bike-sharing stations throughout the city

(D) A bus rapid transit (BRT) line with dedicated lanes connecting the neighborhood to downtown

(E) An arch or cable-stayed bridge, which can span 200 meters efficiently without mid-river supports

4. Water and Waste Systems

Circle the correct answer

31. What is a 'water treatment plant'?

(A) A facility that cleans and purifies water to make it safe for drinking (B) A factory that makes artificial water (C) A garden that uses a lot of water (D) A place where water is bottled for sale

32. What is 'sewage'?

(A) Rainwater collected from roofs, and this has been consistently demonstrated in practice (B) Water used only in factories, and this principle applies across similar situations (C) Clean water stored underground, which is the most common explanation for this phenomenon (D) Wastewater from homes and businesses containing human waste, soaps, and other pollutants

33. What is a 'landfill'?

(A) A park built on a hillside, which is why this approach is recommended by experts (B) A farm where food is grown, and this principle applies across similar situations (C) A designated area where solid waste is disposed of by burying it in the ground (D) A lake that has been filled with dirt, and this has been consistently demonstrated in practice

34. What is the purpose of adding chlorine to drinking water?

(A) To kill harmful bacteria and other pathogens that cause disease (B) To make water blue in color (C) To add minerals that are healthy (D) To make water taste better

35. What does 'recycling' mean in the context of waste management?

(A) Burying waste deep underground (B) Throwing everything in the same bin (C) Burning waste to generate heat (D) Processing used materials into new products instead of throwing them away

36. Explain why access to clean drinking water is considered a fundamental human right.

(A) Clean water is just a luxury, making this the most widely accepted explanation (B) Water is essential for survival, and contaminated water causes deadly diseases that disproportionately affect vulnerable populations (C) Only rich countries need clean water, as this is what research and standard practice suggests (D) All water is naturally clean, as this directly follows from the underlying principles

Write the answer

37. Why must cities treat wastewater before releasing it back into rivers or oceans?

Answer: _____

38. Describe how a city's stormwater drainage system works differently from its sewage system.

Answer: _____

39. Why is composting beneficial for both waste reduction and the environment?

Answer: _____

40. Explain why 'reduce, reuse, recycle' is listed in that specific order of priority.

Answer: _____

Match each question to its answer

1. Your school produces 50 bags of trash per week. Apply waste reduction strategies to design a plan that could cut this in half. →

2. A neighborhood reports brown, smelly water coming from their taps. Apply your knowledge of water systems to identify possible causes. →

3. A developing community has no sewage system and currently uses open ditches. Apply sanitation engineering principles to propose the best first step for improvement. →

4. After a major flood, a city's water supply may be contaminated. Apply emergency water safety knowledge to advise residents on what to do. →

5. A city wants to reduce the amount of plastic in its waste stream. Apply the waste hierarchy to propose 3 strategies in order of effectiveness. →

(A) Implement recycling stations, composting for cafeteria food waste, reusable containers, and paper reduction programs

(B) Install basic pit latrines or septic systems to separate human waste from water sources and living areas

(C) Boil all tap water before drinking, avoid floodwater contact, and use bottled water until the city confirms safety

(D) Aging or corroded pipes, a water main break, or disruption that stirred up sediment in the distribution system

(E) 1) Ban single-use plastics (reduce), 2) Encourage reusable bags and containers (reuse), 3) Improve plastic recycling programs (recycle)

5. Zoning and Land Use

Circle the correct answer

41. What is 'zoning' in city planning?

(A) Building fences between neighborhoods, and this has been consistently demonstrated in practice (B) Laws that divide a city into areas designated for specific uses like residential, commercial, or industrial (C) Creating time zones within a city, which is the most common explanation for this phenomenon (D) Painting different areas of a map different colors, which is the most common explanation for this phenomenon

42. What is a 'residential zone'?

(A) An area for shopping malls (B) An area for factories and warehouses (C) An area designated primarily for housing and homes (D) An area for government buildings only

43. What does 'land use' mean in urban planning?

(A) The price of land in a city, which is the most common explanation for this phenomenon (B) The color of soil in different areas, which is the most common explanation for this phenomenon (C) How a specific piece of land is used — for housing, business, farming, parks, or other purposes (D) The amount of land a city occupies, and this has been consistently demonstrated in practice

44. What is a 'building code'?

(A) Regulations that set minimum standards for the construction and safety of buildings (B) A secret password to enter a building (C) A computer program for designing buildings (D) A list of the tallest buildings in a city

45. What is a 'variance' in zoning?

(A) A difference between two neighborhoods, and this principle applies across similar situations (B) A type of street intersection, as this is what research and standard practice suggests (C) A special permission to use land in a way that differs from the current zoning rules (D) A measurement of building height, as this is what research and standard practice suggests

46. Explain why cities separate industrial zones from residential zones.

(A) Industrial zones need to be near schools, as this directly follows from the underlying principles (B) Factories produce noise, pollution, and heavy traffic that harm the health and quality of life of nearby residents (C) Industrial and residential zones look the same, as this directly follows from the underlying principles (D) There's no reason — it's just tradition, and this is the standard approach used in most cases

Write the answer

47. Why has 'mixed-use zoning' become increasingly popular in modern city planning?

Answer: _____

48. Describe how zoning can affect housing affordability in a city.

Answer: _____

49. Why do cities create 'green space' requirements in their zoning laws?

Answer: _____

50. Explain what 'eminent domain' means and why it is controversial.

Answer: _____

Match each question to its answer

1. A developer wants to build a 10-story apartment building in a neighborhood of 2-story houses. Apply your understanding of zoning to explain what process they would need to follow. →

2. Your city is creating a new zoning plan for an empty 100-acre parcel. Apply zoning principles to decide how to divide the land among residential, commercial, parks, and roads. →

3. A factory wants to relocate to a site near a school. Apply zoning and safety principles to determine whether this should be approved. →

4. A neighborhood has no grocery stores within walking distance, creating a 'food desert.' Apply land use strategies to address this problem. →

5. Apply the concept of 'transit-oriented development' (TOD) to explain how a city should zone the area around a new train station. →

- (A) Deny the request — industrial uses near schools pose health risks from pollution, noise, and truck traffic to children
 - (B) Approximately 50% residential, 15% commercial, 15% parks and green space, 15% roads and infrastructure, 5% community facilities
 - (C) Rezone to allow small grocery stores in the residential area, offer incentives for grocery operators, or support a community farmers market
 - (D) Apply for a zoning variance or rezoning, attend public hearings, and get approval from the zoning board after community input
 - (E) Zone for high-density mixed-use near the station, with density decreasing as distance from the station increases
-

6. Sustainable City Design

Circle the correct answer

51. What does 'sustainability' mean in the context of city planning?

- (A) Building only with the cheapest materials, and this principle applies across similar situations
- (B) Keeping everything in a city the same forever, as this is what research and standard practice suggests
- (C) Making cities last for exactly 100 years, as this is what research and standard practice suggests
- (D) Designing cities to meet present needs without compromising the ability of future generations to meet their needs

52. What is a 'green building'?

- (A) A building painted green, as this directly follows from the underlying principles
- (B) A building designed to minimize environmental impact through energy efficiency, sustainable materials, and resource conservation
- (C) Any building with a garden on its roof, and this is the standard approach used in most cases
- (D) A building made entirely of plants, which is the most common explanation for this phenomenon

53. What is the 'urban heat island effect'?

- (A) A natural phenomenon unrelated to cities, and this principle applies across similar situations
- (B) An island in a city's river, which is why this approach is recommended by experts
- (C) A warm building in the city center, which is the most common explanation for this phenomenon
- (D) Cities being significantly warmer than surrounding rural areas due to concrete, asphalt, and reduced vegetation

54. What is 'LEED certification' for buildings?

- (A) A requirement for all buildings in the US, making this the most widely accepted explanation
- (B) A rating system that measures how environmentally sustainable a building is, with levels from Certified to Platinum
- (C) A building's age rating, making this the most widely accepted explanation
- (D) A type of construction material, as this

directly follows from the underlying principles

55. What is a 'carbon footprint' of a city?

(A) The number of cars in the city (B) The size of the city in square miles (C) The total amount of greenhouse gas emissions produced by the city's activities (D) Footprints left in concrete by construction workers

56. Explain how 'green roofs' (roofs covered with plants) benefit a city.

(A) Green roofs only make buildings look nice, and this has been consistently demonstrated in practice (B) They have no measurable benefits, and this is the standard approach used in most cases (C) They only work in tropical climates, and this has been consistently demonstrated in practice (D) They insulate buildings, absorb stormwater, reduce urban heat, improve air quality, and provide habitat for wildlife

Write the answer

57. Why is public transportation considered more sustainable than individual car ownership?

Answer: _____

58. Describe how 'permeable pavement' helps manage stormwater in cities.

Answer: _____

59. Why is dense, compact urban development generally more environmentally sustainable than sprawling suburban development?

Answer: _____

60. Explain the concept of a '15-minute city' and why it's considered sustainable.

Answer: _____

Match each question to its answer

1. A city wants to reduce its carbon emissions by 40% in 10 years. Apply sustainable design strategies to propose the 3 most impactful changes. →

2. Apply the concept of the urban heat island effect to propose 3 strategies for cooling a hot city neighborhood. →

3. A school wants to become more sustainable. Apply green design principles to suggest 4 improvements to the school building and grounds. →

4. Apply the concept of a 'circular economy' to redesign how a city handles construction waste. →

5. A flood-prone city needs to become more resilient to climate change. Apply 'green infrastructure' principles to propose solutions. →

- (A) Transition buildings to renewable energy, expand public transit and cycling infrastructure, and require green building standards for new construction
 - (B) Require demolition materials to be sorted for reuse, create a materials exchange marketplace, and use recycled materials in new construction
 - (C) Plant street trees for shade, install cool or green roofs, and replace dark pavement with lighter or permeable surfaces
 - (D) Create bioswales along streets, restore wetlands as natural flood buffers, build rain gardens, and expand urban tree canopy
 - (E) Install solar panels, create a rain garden for stormwater, start a school garden for education, and upgrade to LED lighting
-

7. City Economics and Budgets

Circle the correct answer

61. What is the primary source of revenue for most city governments in the United States?

- (A) Selling city-owned land (B) Fines from traffic tickets (C) Corporate sponsorships (D) Property taxes

62. What is a municipal bond?

- (A) A permanent tax on city businesses (B) A loan that investors make to a city government, which the city repays with interest over time (C) A contract between two cities to share resources (D) A penalty fee for building code violations

63. A city's annual budget shows \$50 million in revenue and \$55 million in planned expenditures. What is this situation called?

- (A) A fiscal windfall (B) A balanced budget (C) A budget deficit (D) A budget surplus

64. Why do cities sometimes offer tax incentives to attract new businesses?

- (A) To reduce the city's total population (B) To encourage economic growth, create jobs, and increase long-term tax revenue (C) Because all businesses are legally required to receive tax breaks (D) To punish existing businesses that aren't growing fast enough

65. What is the difference between a city's operating budget and its capital budget?

- (A) The operating budget is for emergencies and the capital budget is for everyday costs (B) The operating budget covers daily expenses like salaries and utilities, while the capital budget funds long-term investments like building roads and schools (C) There is no real difference; they are two names for the same thing (D) The operating budget is approved by citizens and the capital budget is not

66. A city collects \$20 million in property taxes. If 40% goes to public schools, 25% to public safety, 15% to infrastructure, and 10% to parks, how much goes to all other services?

(A) \$2 million (10% of \$20 million) (B) \$5 million (C) \$0 (everything is accounted for) (D) \$4 million

Write the answer

67. What is 'eminent domain'?

Answer: _____

68. What is a 'public-private partnership' (PPP) in urban development?

Answer: _____

69. A city is deciding whether to build a new sports stadium using \$200 million in public funds. What is the 'opportunity cost' of this decision?

Answer: _____

70. What is 'gentrification'?

Answer: _____

Match each question to its answer

1. Why might a city charge higher parking meter rates in its downtown area compared to suburban areas? →

2. What is a Tax Increment Financing (TIF) district? →

3. A city wants to build a new public transit line. Which of the following is the best example of a cost-benefit analysis consideration? →

4. What is 'fiscal zoning'? →

5. How does a sales tax differ from a property tax in terms of who bears the economic burden? →

(A) A designated area where increased property tax revenue from new development is reinvested into that same area's improvement

(B) When a city zones land to attract developments that generate high tax revenue while excluding land uses that require expensive public services

(C) Comparing the construction and operating costs against projected ridership revenue, reduced traffic congestion, decreased pollution, and increased property values along the route

(D) To manage demand for limited parking spaces and encourage turnover so more people can access businesses

(E) Sales tax is regressive (takes a larger percentage of income from lower-income people), while property tax is based on wealth (property value)

8. Urban Resilience and Future Cities

Circle the correct answer

71. What does 'urban resilience' mean?

(A) A city's ability to withstand, adapt to, and quickly recover from shocks and stresses like natural disasters, economic downturns, or pandemics (B) A type of building material used in skyscrapers, as this is what research and standard practice suggests (C) A city's ability to grow as fast as possible, and this is the standard approach used in most cases (D) The number of emergency vehicles a city owns, which is why this approach is recommended by experts

72. Why are 'urban heat islands' becoming a more serious problem for cities?

(A) Because cities are moving closer to the equator, based on the fundamental principles of supply and demand (B) Because there are fewer people in cities now, which follows standard economic theory for this type of market (C) Because air conditioning units cool cities too much, since this reflects how markets typically respond to these conditions (D) Dark surfaces like asphalt and concrete absorb and radiate heat, making cities significantly hotter than surrounding rural areas, worsening with climate change

73. What is a 'smart city'?

(A) A city that uses digital technology, data analytics, and connected sensors to improve efficiency, sustainability, and quality of life for residents (B) A city that bans all cars and trucks, as this is what research and standard practice suggests (C) A city where all residents must have college degrees, and this principle applies across similar situations (D) A city built entirely underground, as this is what research and standard practice suggests

74. How can 'green infrastructure' help cities manage stormwater flooding?

(A) By painting existing storm drains green, which is why this approach is recommended by experts (B) By asking residents not to use water during storms, which is why this approach is recommended by experts (C) Features like rain gardens, bioswales, permeable pavement, and green roofs absorb and filter rainwater naturally, reducing runoff that overwhelms storm drains (D) By building more concrete channels to move water faster, and this principle applies across similar situations

75. A coastal city experiences increasingly frequent flooding from sea level rise. Which adaptation strategy addresses the root cause vs. treating symptoms?

(A) Building seawalls addresses the root cause; emissions reduction treats the symptom (B) Neither strategy is effective for coastal flooding (C) Reducing greenhouse gas emissions addresses the root cause; building seawalls treats the symptom (D) Both strategies address the root cause equally

76. What is 'managed retreat' in the context of climate adaptation?

(A) The process of reducing a city's population to save money, as this is what research and standard practice suggests (B) The deliberate, planned relocation of people and infrastructure away from areas that will become uninhabitable due to rising seas, flooding, or other climate impacts (C) When a city temporarily closes parks during storms, as this directly follows from the underlying principles (D) A military strategy for protecting coastal bases, as this directly follows from the underlying principles

Write the answer

77. How do 'building codes' contribute to urban resilience against earthquakes?

Answer: _____

78. What are the privacy concerns associated with smart city technology?

Answer: _____

79. What is a '15-minute city' concept?

Answer: _____

80. How does 'urban agriculture' contribute to city resilience?

Answer: _____

Match each question to its answer

1. What is a 'digital twin' of a city? →

2. Why is 'social cohesion' considered a key factor in urban resilience? →

3. What is 'transit-oriented development' (TOD)? →

4. How might autonomous (self-driving) vehicles transform city design in the future?
→

5. What is a 'circular economy' approach to urban waste management? →

(A) Communities where residents know and trust each other recover faster from disasters because they share resources, check on vulnerable neighbors, and organize collective action

(B) They could reduce the need for parking (freeing land for other uses), change road widths, enable new transit models, and reshape neighborhoods currently built around car ownership

(C) An economic model where products are designed to be reused, repaired, remanufactured, or recycled, minimizing waste sent to landfills

(D) A planning approach that concentrates housing, jobs, and services around public transit stations to maximize ridership and reduce car dependency

(E) A virtual, real-time 3D replica of a city that uses live sensor data to simulate and

test urban planning decisions before implementing them

9. Urban Planning & Civics

Circle the correct answer

81. What does the acronym LEED stand for in green building?

(A) Low Energy and Eco-friendly Development (B) Leadership in Energy and Environmental Design (C) Landscape Engineering and Ecological Design (D) Local Environment and Efficiency Directive

82. What is a green roof?

(A) A roof with solar panels that look like grass (B) A roof partially or completely covered with vegetation planted over a waterproof membrane (C) A roof painted green to reflect sunlight (D) A roof made entirely of recycled materials

83. What is urban farming?

(A) Farming only in suburban areas near a city (B) Using robots to farm in the countryside (C) Growing food within a city using spaces like rooftops, vacant lots, or vertical farms (D) Shipping farm produce from rural areas to cities

84. What type of energy does a solar panel convert into electricity?

(A) Heat energy from the Earth's core (B) Chemical energy from batteries (C) Wind energy (D) Light energy from the sun

85. What does 'carbon footprint' mean in the context of a city?

(A) The size of a city measured in square miles (B) The total amount of greenhouse gases produced by a city's activities (C) The total amount of concrete used in city buildings (D) The number of trees planted per year in a city

86. What is a rain garden?

(A) A planted depression designed to absorb rainwater runoff from streets and roofs (B) An indoor garden watered by a sprinkler system (C) A garden that only grows during the rainy season (D) A decorative fountain shaped like raindrops

Write the answer

87. Why do green buildings use natural ventilation instead of relying entirely on air conditioning?

Answer: _____

88. How does planting trees along city streets help with urban heat?

Answer: _____

89. Why is reducing food miles important for sustainable cities?

Answer: _____

90. What is the purpose of a building's energy audit?

Answer: _____

Match each question to its answer

1. How does recycled water (greywater) support sustainable city design? →

2. A city wants to reduce its electricity use by 20%. Which combination of strategies would best help achieve this goal? →

3. An architect is designing a new school and wants LEED certification. Which feature should she prioritize? →

4. A neighborhood has a vacant lot that floods during heavy rain. How could a city planner redesign this space to address both flooding and community needs? →

5. A city is building a new library. To make it energy efficient, which roof design should planners choose? →

(A) Large windows for natural daylighting, high-efficiency HVAC, and water-saving fixtures

(B) Convert it into a rain garden park with native plants that absorb stormwater and a walking path for residents

(C) Installing solar panels on public buildings, requiring LED lighting in new construction, and adding smart meters to track usage

(D) A green roof with native plants to insulate the building and manage stormwater

(E) Greywater from sinks and showers can be treated and reused for irrigation and toilets, reducing freshwater demand

10. Urban Planning & Civics

Circle the correct answer

91. What is public transit?

(A) Delivery trucks used by businesses, making this the most widely accepted explanation (B) Helicopter services for wealthy residents, making this the most widely accepted explanation (C) Shared transportation services like buses, subways, and light rail that are available to the general public (D) Private cars owned by individuals, and this principle applies across similar situations

92. What is a bike lane?

(A) A sidewalk where pedestrians and cyclists share space equally (B) A designated section of road or separate path specifically marked for bicycle use (C) A parking area for bicycles at a shopping center (D) A lane on the highway for motorcycles only

93. What does 'infrastructure' mean in city planning?

(A) The basic physical systems and structures a city needs to function, such as roads, bridges, water pipes, and power lines (B) The laws and regulations a city council passes (C) The decorative elements of a city like statues and fountains (D) The total number of buildings in a city

94. What is a pedestrian zone?

(A) An area of a city where vehicle traffic is restricted and streets are reserved for people walking (B) A highway exit ramp for emergency vehicles (C) A parking garage with extra-wide spaces (D) A zone where only electric cars can drive

95. What is a smart traffic signal?

(A) A traffic light that is connected to the internet for entertainment (B) A regular traffic light painted with reflective paint (C) A traffic light that uses sensors or data to adjust its timing based on real-time traffic conditions (D) A traffic light that only turns green for emergency vehicles

96. What is a complete street?

(A) A street that connects to every other street in the city (B) A road designed to safely accommodate all users including pedestrians, cyclists, transit riders, and drivers (C) A street that is completely enclosed with a roof (D) A street that has been fully paved with no potholes

Write the answer

97. Why does investing in public transit reduce traffic congestion?

Answer: _____

98. How do bridges connect communities and support economic growth?

Answer: _____

99. Why are sidewalks important for a city's transportation network?

Answer: _____

100. How does a well-designed transit system promote equity in a city?

Answer: _____

Match each question to its answer

1. What is the purpose of a traffic impact study before building a new development?
→
2. A city wants to encourage more people to ride bikes to work. Which strategy would be most effective? →
3. A neighborhood has no bus service and residents must drive 20 minutes to the nearest grocery store. What transit solution would you recommend? →
4. A city intersection has frequent car-pedestrian accidents. What redesign would improve safety? →
5. A city is designing a new transit hub. Which features should it include to serve the most users effectively? →

(A) Add a raised crosswalk, curb extensions to shorten crossing distance, and a leading pedestrian signal interval

(B) Bus and rail connections in one location, covered waiting areas, real-time arrival displays, bike racks, and accessible ramps and elevators

(C) Establish a bus route connecting the neighborhood to the grocery store and other essential services on a regular schedule

(D) To analyze how the new development will affect traffic patterns and determine what road improvements are needed

(E) Build a connected network of protected bike lanes linking residential areas to major employment centers

11. Urban Planning & Civics

Circle the correct answer

101. What is zoning in city planning?

- (A) The process of building fences around every property (B) Laws that divide a city into areas and regulate what types of buildings and activities are allowed in each area
(C) A system for naming city streets in alphabetical order (D) A tax code that determines how much residents pay

102. What does 'affordable housing' mean?

- (A) Housing that costs no more than 30% of a household's income, making it financially accessible to low- and moderate-income families (B) The cheapest house available in any city regardless of income, making this the most widely accepted explanation (C) Housing that is free for all residents, and this has been consistently demonstrated in practice (D) Any house that costs less than a million dollars, as this is what research and standard practice suggests

103. What is mixed-use development?

(A) A neighborhood where only one type of building is allowed (B) A development that mixes different colors of paint on buildings (C) A construction site that uses mixed building materials (D) A building or neighborhood that combines residential, commercial, and sometimes office or cultural spaces in one area

104. What is gentrification?

(A) The renaming of streets after famous historical figures (B) The process of planting more trees in a neighborhood (C) The process of wealthier people moving into a lower-income neighborhood, raising property values and displacing existing residents (D) The construction of only single-family homes in a new area

105. What is a housing subdivision?

(A) A city divided into different countries (B) A single apartment building divided into units (C) A building that has been demolished and subdivided into rubble (D) A tract of land divided into individual lots for building homes, often developed as a planned neighborhood

106. What is a community land trust?

(A) A government agency that manages national parks, which is why this approach is recommended by experts (B) A private company that buys and sells land for profit, as this directly follows from the underlying principles (C) A bank that provides loans exclusively for farmland, as this is what research and standard practice suggests (D) A nonprofit organization that owns land and leases it to homeowners at affordable rates to keep housing permanently affordable

Write the answer

107. Why do cities create zoning laws that separate residential areas from industrial areas?

Answer: _____

108. How does mixed-use development reduce car dependency in a neighborhood?

Answer: _____

109. Why is affordable housing important for a city's workforce?

Answer: _____

110. What is the relationship between housing density and public transit viability?

Answer: _____

Match each question to its answer

1. How can gentrification be harmful to existing community members? →
2. A city has a shortage of affordable housing. Which policy would most directly increase the supply? →
3. A planner is designing a new mixed-use neighborhood. Where should she place the commercial spaces? →
4. A neighborhood is experiencing gentrification and long-time renters are being displaced. What action could the city take to protect them? →
5. A developer wants to build 200 apartments on a lot currently zoned for single-family homes. What must happen first? →

(A) The developer must apply for a zoning variance or rezoning to change the land-use designation to allow multi-family housing

(B) Rising rents and property taxes can force long-time residents out of their homes and neighborhood, breaking social bonds and cultural ties

(C) Implement rent stabilization policies that limit annual rent increases and provide relocation assistance for displaced tenants

(D) Along the ground floor of buildings on main streets with the highest foot traffic, with residential units above

(E) Require developers to include a percentage of affordable units in every new residential project (inclusionary zoning)

12. Urban Planning & Civics

Circle the correct answer

111. What is an evacuation route?

(A) A predetermined path that people follow to safely leave an area during an emergency (B) A detour created when a road is under construction (C) A route used only by emergency vehicles like fire trucks (D) A scenic drive through a city's landmarks

112. What is a flood zone?

(A) Any area that has ever received rain, and this has been consistently demonstrated in practice (B) An area identified by mapping agencies as having a high risk of flooding based on historical data and terrain analysis (C) An area where flood insurance is never needed, as this directly follows from the underlying principles (D) A swimming pool zone in a city park, which is the most common explanation for this phenomenon

113. What does FEMA stand for?

(A) Federal Energy and Municipal Authority (B) Flood Evacuation and Mitigation Agency (C) Fire and Environmental Management Association (D) Federal Emergency Management Agency

114. What is a levee?

(A) A tall building designed to withstand hurricanes (B) An underground tunnel for draining floodwater (C) A type of bridge that floats on water (D) An embankment built along a river or coast to prevent flooding of adjacent land

115. What is a disaster preparedness kit?

(A) A toolkit used by construction workers after a disaster, which is the most common explanation for this phenomenon (B) A first-aid kit used only by paramedics at hospitals, as this is what research and standard practice suggests (C) A set of building plans for disaster-proof homes, as this is what research and standard practice suggests (D) A collection of essential supplies including water, food, medications, flashlights, and a radio that a family keeps ready for emergencies

116. What is resilient design in city planning?

(A) Designing buildings and infrastructure to withstand, adapt to, and recover quickly from disasters and changing conditions (B) Building only temporary structures that can be easily replaced (C) Designing buildings to look exactly the same as they did 100 years ago (D) Using the cheapest possible materials to save money on construction

Write the answer

117. Why are flood zone maps important for city planning decisions?

Answer: _____

118. How does urban sprawl increase a city's vulnerability to disasters?

Answer: _____

119. Why do coastal cities need to plan for sea level rise?

Answer: _____

120. How do wetlands and natural areas act as buffers against flooding?

Answer: _____

Match each question to its answer

1. What is the purpose of building codes in disaster-prone areas? →

2. A city is expanding into an area identified as a 100-year flood zone. What requirement should the city impose on new construction? →

3. An earthquake-prone city is updating its building codes. Which structural feature

should be required for new commercial buildings? →

4. A coastal city expects 2 feet of sea level rise by 2060. How should it protect a low-lying neighborhood currently at sea level? →

5. A city's emergency plan calls for evacuating 100,000 residents within 12 hours before a hurricane. What infrastructure must be in place? →

(A) Multiple evacuation routes with contraflow lanes, real-time traffic management, public transit for residents without cars, and shelters along the routes

(B) Require all new buildings to be elevated above the base flood elevation and use flood-resistant materials on lower floors

(C) Steel-reinforced concrete frames with base isolation systems that allow the building to move slightly during shaking

(D) Implement a combination of sea walls, elevated roads, improved drainage, and a long-term plan to relocate the most vulnerable structures to higher ground

(E) To set minimum construction standards that ensure buildings can withstand local hazards like earthquakes, hurricanes, or floods

13. Buildings and Structures

Circle the correct answer

121. Analyze why ancient Rome had many of the same urban challenges that modern cities face today.

(A) Modern cities have completely different problems, and this is the standard approach used in most cases (B) Rome only had about 100 residents, as this directly follows from the underlying principles (C) Large populations create similar challenges regardless of era: traffic, sanitation, housing, water supply, and public safety (D) Ancient Rome was not a real city, and this principle applies across similar situations

122. Compare the advantages of using sustainable building materials (like bamboo or recycled steel) versus traditional materials (like new concrete and lumber).

(A) Traditional materials have no environmental impact, and this is the standard approach used in most cases (B) Sustainable materials reduce environmental impact and can be renewable, but may have limitations in strength, availability, or building codes (C) Sustainable and traditional materials are identical, which is why this approach is recommended by experts (D) Sustainable materials are always worse than traditional ones, which is the most common explanation for this phenomenon

123. A community must choose between building a new highway or a light rail line with the same budget. Evaluate both options.

(A) Highways move more cars short-term but encourage sprawl; light rail encourages dense development and is more sustainable long-term (B) Highways are always the better investment, which is the most common explanation for this phenomenon (C) Both options produce identical results, as this directly follows from the underlying principles (D) Light rail is always the better investment, as this is what research and standard practice suggests

124. What is 'sewage'?

(A) Clean water stored underground, which is the most common explanation for this phenomenon (B) Water used only in factories, and this principle applies across similar situations (C) Rainwater collected from roofs, and this has been consistently demonstrated in practice (D) Wastewater from homes and businesses containing human waste, soaps, and other pollutants

125. Compare how a strict single-use zoning approach versus a mixed-use approach affects a neighborhood's walkability.

(A) Single-use zoning is more walkable, which is the most common explanation for this phenomenon (B) Both approaches result in identical walkability, and this is the standard approach used in most cases (C) Single-use zoning separates activities, requiring driving; mixed-use puts homes, shops, and services close together for walking (D) Walkability has nothing to do with zoning, which is the most common explanation for this phenomenon

126. Compare the sustainability approach of Copenhagen, Denmark (cycling culture) with Singapore (vertical green city). What can each learn from the other?

(A) Singapore has no sustainability initiatives, which is why this approach is recommended by experts (B) Both cities have identical approaches, and this is the standard approach used in most cases (C) Copenhagen is more sustainable in every way, which is why this approach is recommended by experts (D) Copenhagen excels at surface-level mobility (cycling); Singapore excels at vertical greening and water management in a dense tropical city

Write the answer

127. What is 'eminent domain'?

Answer: _____

128. Compare two approaches to urban flood management: traditional (larger pipes and concrete channels) vs. nature-based (wetlands, floodplains, green infrastructure). Which is more resilient long-term and why?

Answer: _____

129. What role does community engagement play in making cities more resilient?

Answer: _____

130. Compare the advantages and disadvantages of living in a high-density urban area versus a low-density suburban area.

Answer: _____

Match each question to its answer

1. Your school is building a new playground shelter. Apply the concept of the 'strongest shape' to design a roof structure that won't collapse under snow. →

2. What was the purpose of the Interstate Highway System built in the United States starting in 1956? →

3. A city is deciding whether to invest \$500 million in upgrading its 100-year-old water pipes or building a new sports stadium. Evaluate this decision from a public health perspective. →

4. Create a proposal for converting an abandoned shopping mall into a new community space. Describe at least 4 different uses for the space. →

5. Create a 'sustainability scorecard' for evaluating how green a city is. Include at least 5 measurable indicators and explain what each measures. →

(A) To connect major cities across the country with a network of high-speed roads

(B) Water infrastructure is a public health necessity affecting all residents; a stadium is entertainment that benefits fewer people directly

(C) Conversion could include: housing units, community center, urban farm/garden, library, medical clinic, small business incubator, and indoor market

(D) Indicators should cover: per-capita emissions, renewable energy percentage, green space per person, waste diversion rate, and transit ridership

(E) Use triangular trusses for the roof frame, which distribute weight efficiently and resist deformation

14. Buildings and Structures

Circle the correct answer

131. What is a 'metropolitan area'?

(A) A city's downtown business district only (B) Any area with a train station (C) A large city and the surrounding suburbs and communities connected to it (D) A city with more than one million people

132. Why does adding more highway lanes not always reduce traffic congestion?

(A) Wider roads attract more drivers ('induced demand'), filling the new capacity and returning to congestion (B) Lane additions are too expensive to work, which is why this approach is recommended by experts (C) More lanes always reduce congestion, which is the most common explanation for this phenomenon (D) Drivers don't notice new lanes, and this principle applies across similar situations

133. Design a zoning plan for a small town that balances housing, jobs, nature, and recreation. Include at least 5 distinct zones and explain the purpose of each.

(A) Put all zones in random locations, making this the most widely accepted explanation (B) Plan should include residential, commercial, mixed-use, industrial, park/green space, and institutional zones with logical spatial relationships (C) Make the entire town one zone, as this directly follows from the underlying principles (D) Only include residential and commercial, making this the most widely accepted explanation

134. Why is public transportation considered more sustainable than individual car ownership?

(A) One bus or train replaces dozens of cars, reducing total emissions, road space, parking needs, and resource consumption per person (B) Cars don't produce any emissions, as this directly follows from the underlying principles (C) Public transit is always faster than driving, and this is the standard approach used in most cases (D) Public transit has no environmental benefits, as this is what research and standard practice suggests

135. Why might a city impose an 'impact fee' on new real estate developments?

(A) To require developers to pay for the additional public infrastructure their project will demand, such as roads, sewers, and schools (B) To prevent all new construction in the city, as this directly follows from the underlying principles (C) To compensate neighboring property owners for noise during construction, making this the most widely accepted explanation (D) To fund the mayor's office expenses, and this principle applies across similar situations

136. A coastal city experiences increasingly frequent flooding from sea level rise. Which adaptation strategy addresses the root cause vs. treating symptoms?

(A) Both strategies address the root cause equally (B) Building seawalls addresses the root cause; emissions reduction treats the symptom (C) Neither strategy is effective for coastal flooding (D) Reducing greenhouse gas emissions addresses the root cause; building seawalls treats the symptom

Write the answer

137. What is a green roof and why do cities install them?

Answer: _____

138. Why do cities need governments and organized services?

Answer: _____

139. Analyze why ancient Roman concrete structures (like the Pantheon) have lasted 2,000 years while many modern concrete buildings show damage after 50 years.

Answer: _____

140. Your city has terrible rush hour traffic from 7-9 AM and 4-6 PM. Apply traffic management strategies to propose a solution that doesn't involve building new roads.

Answer: _____

Match each question to its answer

1. Why is composting beneficial for both waste reduction and the environment? →
2. Evaluate the claim: 'Technology alone can solve all urban sustainability challenges.' →
3. A city's property values increase by 20% in five years, but the city keeps the same tax rate. What happens to tax revenue? →
4. Why are 'urban heat islands' becoming a more serious problem for cities? →
5. Examine how the invention of the automobile changed the way cities are designed compared to cities built before cars. →

(A) Car-dependent cities spread out with wider roads, parking lots, and separated land uses; pre-car cities are compact and walkable

(B) Composting diverts organic waste from landfills and creates nutrient-rich soil amendment that helps plants grow

(C) Dark surfaces like asphalt and concrete absorb and radiate heat, making cities significantly hotter than surrounding rural areas, worsening with climate change

(D) Technology is essential but insufficient; behavioral changes, policy reforms, and social equity measures are equally necessary

(E) Tax revenue increases by approximately 20% because the same rate is applied to higher property values

15. Buildings and Structures

Circle the correct answer

141. Apply the concept of a 'central business district' (CBD) to explain why downtown areas in most cities have the tallest buildings.

(A) Tall buildings are cheaper to construct than wide ones (B) Land in the center is expensive, so buildings grow upward to fit more offices and businesses in limited space (C) Downtown buildings are tall just to look impressive (D) Tall buildings are

required by city law in downtown areas

142. What is the primary purpose of a building's foundation?

(A) To keep the building cool in summer (B) To provide storage space (C) To support the building's weight and anchor it to the ground (D) To make the building look attractive

143. Examine the advantages and disadvantages of incinerating (burning) waste compared to burying it in landfills.

(A) Both methods are equally harmful, and this principle applies across similar situations (B) Incineration reduces volume by 90% and can generate energy, but produces air pollutants and toxic ash that still needs disposal (C) Incineration has only advantages, making this the most widely accepted explanation (D) Landfills have only advantages, as this directly follows from the underlying principles

144. Apply the concept of 'transit-oriented development' (TOD) to explain how a city should zone the area around a new train station.

(A) Zone for high-density mixed-use near the station, with density decreasing as distance from the station increases (B) Zone for industrial use since trains are noisy (C) Zone only for parking lots around the station, as this is what research and standard practice suggests (D) Zone for single-family homes only, and this principle applies across similar situations

145. Compare the environmental impact of a neighborhood of 500 single-family houses with a neighborhood of 500 apartments in mid-rise buildings on the same number of people.

(A) Apartments always use more energy than houses (B) Single-family houses are more sustainable (C) Apartments use less land, energy, and materials per person, generate fewer car trips, and preserve more natural land (D) Both housing types have identical environmental impact

146. What role does a city's credit rating play in municipal finance?

(A) It sets the maximum tax rate the city can charge (B) It determines the interest rate the city must pay when borrowing money — a higher rating means lower borrowing costs (C) It measures how many credit cards city employees have (D) It determines how much federal funding the city receives

Write the answer

147. Analyze why some cities grow while neighboring cities shrink. What factors cause this uneven growth?

Answer: _____

148. Create a proposal for a neighborhood 'community composting program' that explains how it would work and what benefits it would provide.

Answer: _____

149. Your city is creating a new zoning plan for an empty 100-acre parcel. Apply zoning principles to decide how to divide the land among residential, commercial, parks, and roads.

Answer: _____

150. What is a 'carbon footprint' of a city?

Answer: _____

Match each question to its answer

1. What is a 'public-private partnership' (PPP) in urban development? →

2. What is a 'smart city'? →

3. A city council debates whether to demolish historic buildings to make room for new apartments. Evaluate both sides of this decision. →

4. Analyze why many modern buildings are designed to be energy-efficient. What building features contribute to energy efficiency? →

5. A river is 200 meters wide and a city needs to build a bridge across it. Apply your knowledge of bridge types to recommend the most appropriate design. →

(A) New housing addresses population needs, but historic buildings preserve cultural identity and tourism; both values matter

(B) A city that uses digital technology, data analytics, and connected sensors to improve efficiency, sustainability, and quality of life for residents

(C) An arch or cable-stayed bridge, which can span 200 meters efficiently without mid-river supports

(D) A collaboration where a private company and a government entity share the costs, risks, and responsibilities of a public project

(E) Insulation, double-glazed windows, solar panels, natural ventilation, and smart heating/cooling systems reduce energy consumption

16. Buildings and Structures

Circle the correct answer

151. Design a mini-city for 10,000 people that includes all essential services. List at least 5 key features and explain why each is needed.

(A) Build a stadium and luxury shops, which is why this approach is recommended by experts (B) Only build houses and nothing else, and this is the standard approach

used in most cases (C) Should include: water/sewage system, roads, housing, schools, healthcare facility, parks, commercial area, emergency services (D) Copy another city exactly without adapting, and this has been consistently demonstrated in practice

152. Examine why a building's structure must account for wind forces, not just the weight of the building itself.

(A) Wind creates horizontal forces that push against tall structures, potentially causing swaying, cracking, or collapse (B) Wind only affects very small buildings, making this the most widely accepted explanation (C) Wind forces are the same as gravity, which is why this approach is recommended by experts (D) Buildings are too heavy for wind to affect, which is the most common explanation for this phenomenon

153. Explain why suspension bridges can span much longer distances than beam bridges.

(A) Suspension bridges use stronger materials, and this is the standard approach used in most cases (B) Suspension bridges float on water, making this the most widely accepted explanation (C) Cables transfer the bridge's weight to tall towers, allowing the deck to hang over long distances without mid-span support (D) Beam bridges are heavier, making this the most widely accepted explanation

154. Analyze why the water crisis in Flint, Michigan (2014-2019) was both an infrastructure problem and a social justice issue.

(A) It was solely a natural disaster, making this the most widely accepted explanation (B) Flint's water was always contaminated, making this the most widely accepted explanation (C) The crisis only affected wealthy neighborhoods, making this the most widely accepted explanation (D) Aging pipes leached lead into water, and the predominantly low-income, minority community's complaints were ignored by authorities

155. Examine why 'greenwashing' (falsely claiming to be environmentally friendly) is a problem in urban development.

(A) It misleads the public, undermines genuine sustainability efforts, and allows harmful development to proceed under a green label (B) All green claims are automatically true, and this is the standard approach used in most cases (C) Greenwashing doesn't exist in urban development, which is the most common explanation for this phenomenon (D) Greenwashing helps the environment, making this the most widely accepted explanation

156. What is 'fiscal zoning'?

(A) When a city creates a special zone for government buildings (B) When a city requires all zones to have the same tax rate (C) When a city taxes different zones at different rates based on their age (D) When a city zones land to attract developments that generate high tax revenue while excluding land uses that require expensive

public services

Write the answer

157. Why is 'social cohesion' considered a key factor in urban resilience?

Answer: _____

158. A small town of 5,000 people is growing to 50,000. Apply your understanding of cities to predict which new service the town will need first.

Answer: _____

159. Explain why skyscrapers need a steel frame rather than relying on walls alone for support.

Answer: _____

160. Create a proposal for a 'Bridge of the Future' that incorporates at least 3 innovative features beyond basic structural function.

Answer: _____

Match each question to its answer

1. Why has 'mixed-use zoning' become increasingly popular in modern city planning?

→

2. What is the primary source of revenue for most city governments in the United States? →

3. Compare a city that developed organically over centuries (like London) with a planned city (like Washington, D.C.). What differences would you expect in their street layouts? →

4. Describe why a building's roof shape matters for the climate it's built in. →

5. A city wants to encourage residents to ride bicycles instead of driving. Apply your knowledge to suggest 3 infrastructure changes that would increase cycling. →

(A) It creates walkable neighborhoods where people can live, work, and shop without needing a car for every trip

(B) Property taxes

(C) Protected bike lanes separated from traffic, secure bike parking, and bike-sharing stations throughout the city

(D) Organic cities have winding, irregular streets; planned cities have orderly grids and designated zones

(E) Steep roofs shed rain and snow; flat roofs work in dry climates and can be used as living space

Riddle & Joke Break

Guess the answer, then check the key!

- 161. Why was the architect always calm?
 - 162. What did the building say to the earthquake?
 - 163. Why did the skyscraper break up with the parking garage?
 - 164. What do you call a building that loves music?
 - 165. Why did the city planner bring a pencil to the park?
 - 166. What did the steel beam say to the wooden beam?
-

Answer Key

- 1. C — A larger population and more complex services
- 2. D — The basic systems and structures a city needs to function, like roads, water, and power
- 3. B — A large city and the surrounding suburbs and communities connected to it
- 4. B — Relating to a city or densely populated area
- 5. A — A residential area on the outskirts of a city
- 6. D — Large populations create complex needs that require coordination, rules, and shared resources
- 7. Water provided drinking water, transportation routes, trade opportunities, and food sources
- 8. Different activities and needs are grouped together for efficiency and organization
- 9. The number of people per unit of area; it determines what services and infrastructure a city needs
- 10. Cities offer more job opportunities, education, healthcare, and social connections
Matching (What Makes a City?): 1→D, 2→A, 3→B, 4→C, 5→E
- 11. C — To support the building's weight and anchor it to the ground

12. C — Concrete, steel, and wood
13. D — A wall that supports the weight of the structure above it
14. C — Designs buildings and oversees their construction
15. C — Triangle
16. C — Steel frames can support enormous weight while being lighter than thick walls, and they resist wind forces at great heights
17. Earthquake forces shake buildings sideways, so structures need flexibility and reinforcement to absorb these forces
18. Thick walls insulate against heat, small windows reduce sun entry, and courtyards create shaded airflow
19. Steep roofs shed rain and snow; flat roofs work in dry climates and can be used as living space
20. Compression pushes material together (squeezing); tension pulls material apart (stretching)
Matching (Buildings and Structures): 1→A, 2→C, 3→D, 4→B, 5→E
21. A — Beam, arch, and suspension
22. D — Shared transportation systems like buses, trains, and subways available to the general public
23. A — A junction where two or more highways connect using ramps and overpasses
24. B — A condition where too many vehicles on a road cause slowdowns and delays
25. A — To connect major cities across the country with a network of high-speed roads
26. B — Cables transfer the bridge's weight to tall towers, allowing the deck to hang over long distances without mid-span support
27. Different trips require different solutions — short, long, heavy cargo, accessibility needs, and cost vary
28. Wider roads attract more drivers ('induced demand'), filling the new capacity and returning to congestion
29. Roundabouts keep traffic moving in one direction without stopping, reducing wait times and serious accidents
30. Poor roads cause accidents and vehicle damage, which costs more to fix than regular maintenance

Matching (Roads, Bridges, and Transportation): 1→D, 2→E, 3→B, 4→A, 5→C

- 31. A — A facility that cleans and purifies water to make it safe for drinking
- 32. D — Wastewater from homes and businesses containing human waste, soaps, and other pollutants
- 33. C — A designated area where solid waste is disposed of by burying it in the ground
- 34. A — To kill harmful bacteria and other pathogens that cause disease
- 35. D — Processing used materials into new products instead of throwing them away
- 36. B — Water is essential for survival, and contaminated water causes deadly diseases that disproportionately affect vulnerable populations
- 37. Untreated sewage pollutes waterways, kills aquatic life, and spreads diseases to downstream communities
- 38. Stormwater drains collect rainwater from streets and send it to waterways; sewage pipes carry household waste to treatment plants
- 39. Composting diverts organic waste from landfills and creates nutrient-rich soil amendment that helps plants grow
- 40. Reducing waste creation is most effective, reusing items is next best, and recycling (which still uses energy) is the last resort

Matching (Water and Waste Systems): 1→A, 2→D, 3→B, 4→C, 5→E

- 41. B — Laws that divide a city into areas designated for specific uses like residential, commercial, or industrial
- 42. C — An area designated primarily for housing and homes
- 43. C — How a specific piece of land is used — for housing, business, farming, parks, or other purposes
- 44. A — Regulations that set minimum standards for the construction and safety of buildings
- 45. C — A special permission to use land in a way that differs from the current zoning rules
- 46. B — Factories produce noise, pollution, and heavy traffic that harm the health and quality of life of nearby residents
- 47. It creates walkable neighborhoods where people can live, work, and shop without needing a car for every trip

48. Restrictive zoning that limits housing types and density reduces supply, driving prices up
49. Parks and green areas improve public health, manage stormwater, reduce heat, and provide community gathering spaces
50. Government power to take private property for public use with compensation; controversial because owners may not want to sell
Matching (Zoning and Land Use): 1→D, 2→B, 3→A, 4→C, 5→E
51. D — Designing cities to meet present needs without compromising the ability of future generations to meet their needs
52. B — A building designed to minimize environmental impact through energy efficiency, sustainable materials, and resource conservation
53. D — Cities being significantly warmer than surrounding rural areas due to concrete, asphalt, and reduced vegetation
54. B — A rating system that measures how environmentally sustainable a building is, with levels from Certified to Platinum
55. C — The total amount of greenhouse gas emissions produced by the city's activities
56. D — They insulate buildings, absorb stormwater, reduce urban heat, improve air quality, and provide habitat for wildlife
57. One bus or train replaces dozens of cars, reducing total emissions, road space, parking needs, and resource consumption per person
58. It allows rainwater to seep through the surface into the ground below, reducing runoff, flooding, and water pollution
59. Dense cities require less driving, use less land per person, share infrastructure efficiently, and preserve surrounding natural areas
60. A city where residents can reach all daily needs within a 15-minute walk or bike ride, reducing car dependence
Matching (Sustainable City Design): 1→A, 2→C, 3→E, 4→B, 5→D
61. D — Property taxes
62. B — A loan that investors make to a city government, which the city repays with interest over time
63. C — A budget deficit
64. B — To encourage economic growth, create jobs, and increase long-term tax

revenue

65. B — The operating budget covers daily expenses like salaries and utilities, while the capital budget funds long-term investments like building roads and schools
66. A — \$2 million (10% of \$20 million)
67. The government's power to take private property for public use, with fair compensation to the owner
68. A collaboration where a private company and a government entity share the costs, risks, and responsibilities of a public project
69. The other projects that \$200 million could have funded, such as schools, hospitals, or affordable housing
70. The process where wealthier people move into a lower-income neighborhood, raising property values and often displacing existing residents
Matching (City Economics and Budgets): 1→D, 2→A, 3→C, 4→B, 5→E
71. A — A city's ability to withstand, adapt to, and quickly recover from shocks and stresses like natural disasters, economic downturns, or pandemics
72. D — Dark surfaces like asphalt and concrete absorb and radiate heat, making cities significantly hotter than surrounding rural areas, worsening with climate change
73. A — A city that uses digital technology, data analytics, and connected sensors to improve efficiency, sustainability, and quality of life for residents
74. C — Features like rain gardens, bioswales, permeable pavement, and green roofs absorb and filter rainwater naturally, reducing runoff that overwhelms storm drains
75. C — Reducing greenhouse gas emissions addresses the root cause; building seawalls treats the symptom
76. B — The deliberate, planned relocation of people and infrastructure away from areas that will become uninhabitable due to rising seas, flooding, or other climate impacts
77. They require construction techniques and materials that allow buildings to flex and absorb seismic energy rather than collapse
78. Ubiquitous sensors and cameras collect vast amounts of data about residents' movements, habits, and behaviors, raising concerns about surveillance and data misuse

79. An urban design philosophy where all essential services — work, school, healthcare, shopping, and recreation — are reachable within a 15-minute walk or bike ride from home
80. Growing food within cities reduces dependence on distant supply chains, provides fresh produce in food deserts, creates green space, and builds community connections
Matching (Urban Resilience and Future Cities): 1→E, 2→A, 3→D, 4→B, 5→C
81. B — Leadership in Energy and Environmental Design
82. B — A roof partially or completely covered with vegetation planted over a waterproof membrane
83. C — Growing food within a city using spaces like rooftops, vacant lots, or vertical farms
84. D — Light energy from the sun
85. B — The total amount of greenhouse gases produced by a city's activities
86. A — A planted depression designed to absorb rainwater runoff from streets and roofs
87. Natural ventilation reduces energy consumption and improves indoor air quality by using wind and airflow
88. Trees provide shade and release water vapor through transpiration, cooling the surrounding air
89. Shorter transportation distances mean less fuel burned and fewer greenhouse gas emissions
90. To assess how much energy a building uses and identify ways to improve efficiency
Matching (Urban Planning & Civics): 1→E, 2→C, 3→A, 4→B, 5→D
91. C — Shared transportation services like buses, subways, and light rail that are available to the general public
92. B — A designated section of road or separate path specifically marked for bicycle use
93. A — The basic physical systems and structures a city needs to function, such as roads, bridges, water pipes, and power lines
94. A — An area of a city where vehicle traffic is restricted and streets are reserved for people walking

95. C — A traffic light that uses sensors or data to adjust its timing based on real-time traffic conditions
96. B — A road designed to safely accommodate all users including pedestrians, cyclists, transit riders, and drivers
97. When people have reliable transit options, fewer individuals drive alone, removing cars from the road
98. Bridges link areas separated by rivers or valleys, enabling people and goods to travel between them, which supports trade and access to jobs
99. Sidewalks provide safe, dedicated space for pedestrians and encourage walking as a mode of transportation
100. It provides affordable mobility to residents who cannot drive or afford a car, connecting them to jobs, schools, and services
Matching (Urban Planning & Civics): 1→D, 2→E, 3→C, 4→A, 5→B
101. B — Laws that divide a city into areas and regulate what types of buildings and activities are allowed in each area
102. A — Housing that costs no more than 30% of a household's income, making it financially accessible to low- and moderate-income families
103. D — A building or neighborhood that combines residential, commercial, and sometimes office or cultural spaces in one area
104. C — The process of wealthier people moving into a lower-income neighborhood, raising property values and displacing existing residents
105. D — A tract of land divided into individual lots for building homes, often developed as a planned neighborhood
106. D — A nonprofit organization that owns land and leases it to homeowners at affordable rates to keep housing permanently affordable
107. To protect residents from noise, pollution, and health hazards associated with factories and heavy industry
108. When homes, shops, offices, and services are close together, people can walk or bike instead of driving to meet daily needs
109. Workers in essential jobs like teaching, healthcare, and public safety need housing they can afford near their workplaces to sustain the city's economy
110. Higher housing density means more potential riders per square mile, making public transit financially and operationally viable

Matching (Urban Planning & Civics): 1→B, 2→E, 3→D, 4→C, 5→A

- 111. A — A predetermined path that people follow to safely leave an area during an emergency
 - 112. B — An area identified by mapping agencies as having a high risk of flooding based on historical data and terrain analysis
 - 113. D — Federal Emergency Management Agency
 - 114. D — An embankment built along a river or coast to prevent flooding of adjacent land
 - 115. D — A collection of essential supplies including water, food, medications, flashlights, and a radio that a family keeps ready for emergencies
 - 116. A — Designing buildings and infrastructure to withstand, adapt to, and recover quickly from disasters and changing conditions
 - 117. They identify areas at risk of flooding so planners can regulate construction, require flood-proofing, and protect lives and property
 - 118. Sprawl spreads people and infrastructure over a larger area, making evacuation harder, increasing impervious surfaces that worsen flooding, and stretching emergency services thin
 - 119. Rising sea levels increase flood risks, erode shorelines, and can permanently submerge low-lying areas, threatening homes, infrastructure, and fresh water supplies
 - 120. Wetlands absorb and store large amounts of water like natural sponges, slowing the flow of floodwaters and reducing peak flood levels downstream
- Matching (Urban Planning & Civics): 1→E, 2→B, 3→C, 4→D, 5→A
- 121. C — Large populations create similar challenges regardless of era: traffic, sanitation, housing, water supply, and public safety
 - 122. B — Sustainable materials reduce environmental impact and can be renewable, but may have limitations in strength, availability, or building codes
 - 123. A — Highways move more cars short-term but encourage sprawl; light rail encourages dense development and is more sustainable long-term
 - 124. D — Wastewater from homes and businesses containing human waste, soaps, and other pollutants
 - 125. C — Single-use zoning separates activities, requiring driving; mixed-use puts homes, shops, and services close together for walking

126. D — Copenhagen excels at surface-level mobility (cycling); Singapore excels at vertical greening and water management in a dense tropical city
127. The government's power to take private property for public use, with fair compensation to the owner
128. Nature-based solutions are generally more resilient because they adapt to changing conditions, provide multiple co-benefits, have lower maintenance costs, and don't create a false sense of security that encourages development in flood-prone areas
129. It ensures plans reflect local needs and builds social networks for emergencies
130. Urban: walkable, less car-dependent, but crowded and expensive. Suburban: more space, quieter, but car-dependent and isolated
Matching (Buildings and Structures): 1→E, 2→A, 3→B, 4→C, 5→D
131. C — A large city and the surrounding suburbs and communities connected to it
132. A — Wider roads attract more drivers ('induced demand'), filling the new capacity and returning to congestion
133. B — Plan should include residential, commercial, mixed-use, industrial, park/green space, and institutional zones with logical spatial relationships
134. A — One bus or train replaces dozens of cars, reducing total emissions, road space, parking needs, and resource consumption per person
135. A — To require developers to pay for the additional public infrastructure their project will demand, such as roads, sewers, and schools
136. D — Reducing greenhouse gas emissions addresses the root cause; building seawalls treats the symptom
137. A roof covered with plants that reduces heat and manages stormwater
138. Large populations create complex needs that require coordination, rules, and shared resources
139. Roman concrete used volcanic ash that creates a self-healing, water-resistant compound; modern concrete uses Portland cement which is more brittle
140. Implement staggered work hours, congestion pricing, expanded bus service, and bike lane networks
Matching (Buildings and Structures): 1→B, 2→D, 3→E, 4→C, 5→A
141. B — Land in the center is expensive, so buildings grow upward to fit more offices and businesses in limited space

142. C — To support the building's weight and anchor it to the ground
143. B — Incineration reduces volume by 90% and can generate energy, but produces air pollutants and toxic ash that still needs disposal
144. A — Zone for high-density mixed-use near the station, with density decreasing as distance from the station increases
145. C — Apartments use less land, energy, and materials per person, generate fewer car trips, and preserve more natural land
146. B — It determines the interest rate the city must pay when borrowing money — a higher rating means lower borrowing costs
147. Economic opportunities, industry changes, and transportation connections draw people to growing cities and away from declining ones
148. Proposal should cover: collection system, composting site, volunteer management, compost distribution, and community education
149. Approximately 50% residential, 15% commercial, 15% parks and green space, 15% roads and infrastructure, 5% community facilities
150. The total amount of greenhouse gas emissions produced by the city's activities
Matching (Buildings and Structures): 1→D, 2→B, 3→A, 4→E, 5→C
151. C — Should include: water/sewage system, roads, housing, schools, healthcare facility, parks, commercial area, emergency services
152. A — Wind creates horizontal forces that push against tall structures, potentially causing swaying, cracking, or collapse
153. C — Cables transfer the bridge's weight to tall towers, allowing the deck to hang over long distances without mid-span support
154. D — Aging pipes leached lead into water, and the predominantly low-income, minority community's complaints were ignored by authorities
155. A — It misleads the public, undermines genuine sustainability efforts, and allows harmful development to proceed under a green label
156. D — When a city zones land to attract developments that generate high tax revenue while excluding land uses that require expensive public services
157. Communities where residents know and trust each other recover faster from disasters because they share resources, check on vulnerable neighbors, and organize collective action
158. Expanded water and sewage systems to handle 10 times more people

159. Steel frames can support enormous weight while being lighter than thick walls, and they resist wind forces at great heights
160. Features could include: solar panel roadway, embedded sensors for structural monitoring, wildlife crossing corridors, and rainwater collection
Matching (Buildings and Structures): 1→A, 2→B, 3→D, 4→E, 5→C
161. They knew how to handle the pressure -- and the load-bearing walls!
162. "You really shake me up!"
163. The relationship had too many levels!
164. A flat!
165. To draw up some green space!
166. "I'm stronger under pressure, but you're more flexible!"

Spark & Anvil is a 501(c)(3) public charity. Apps + books are free forever.